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TRANSCRIPT OF RECORD

Supreme Court of the United States

OCTOBER TERM, 1928 1930

No. 528

CONCRETE MIXING & CONVEYING COMPANY, PETITIONER,

vs.

R. C. STORRIE & COMPANY

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

PETITION FOR CERTIORARI FILED NOVEMBER 5, 1928

CERTIORARI GRANTED DECEMBER 10, 1928

(33,837)

(33,837)

SUPREME COURT OF THE UNITED STATES

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ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT

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660 Colman Building, Seattle, Washington.

[1*]

In the District Court of the United States for the Western District of Washington, Northern Division.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Defendant.

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*Page-number appearing at the foot of page of original certified Transcript of Record.

PLACITA.

Pleas in the District Court of the United States for the Western District of Washington, Northern Division, begun and held at the United States courtroom in the City of Seattle, in said District and Division, before the Honorable George M. Bourquin, District Judge of the United States for the District of Montana, sitting by assignment in said District and Division, on the 13th day of September, in the year of our Lord one thousand nine hundred and twenty-seven, being one of the days of the regular May term of said court begun on Tuesday, the third day of May, 1927, and of our Independence the one hundred and fifty-second year. Present, Honorable George M. Bourquin.

E. B. BENN,
Marshal.
Ed. M. Lakin,
Clerk.

[Endorsed]: Filed Mar. 1, 1928. [2]

United States District Court, Western District of Washington.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Defendants.

BILL OF COMPLAINT.

Plaintiff, for complaint against defendants, alleges as follows:

(1) Plaintiff, Concrete Mixing and Conveying Company, is a corporation organized and existing under and by virtue of the laws of the State of Illinois, having its principal place of business at Chicago, in the County of Cook and State of Illinois. Defendants, Robert C. Storrie and Robert G. Muir, are partners doing business as R. C. Storrie & Company, and have a regular and established place of business at Seattle, in the County of King and State of Washington, within the Western District of Washington, within which district they have committed acts of infringement of plaintiff's patent, of which complaint is made herein.

(2) John H. McMichael being, prior to January 14, 1907, the original, first and sole inventor of certain new and useful improvements in method of and

apparatus for transporting and treating concrete, lawfully filed and prosecuted an application for United States letters patent therefor, and having complied in all respects with the statutes, and having duly assigned said invention and application to plaintiff by mesne assignments, United States patent No. 1,127,660 was lawfully granted and issued [3] pursuant to said application to plaintiff on February 9, 1915.

Said invention of John H. McMichael was new and useful, not known or used by others in this country before his invention thereof, not patented or described in any printed publication anywhere before his invention or more than two years prior to said application for United States patent therefor, not in public use on sale in the United States for more than two years prior to said application for United States letters patent therefor, not patented in any foreign country by him or his legal representatives on an application filed more than one year before his said application for United States letters patent, and not abandoned. Said United States letters patent No. 1,127,660 is now in full force and is hereby proffered and ready to be produced before the court.

(3) The invention patented in the aforesaid patent No. 1,127,660 is of great utility and has been introduced into public use by the plaintiff, and the public generally has acquiesced in and acknowledged the utility of said invention, and the validity of said letters patent, and the plaintiff's exclusive rights thereunder.

(4) Plaintiff is and always has been the sole owner of said United States letters patent No. 1,127,660 and of all rights of action for infringement thereof.

(5) Plaintiff alleges that defendants have heretofore recognized the validity of said patent and plaintiff's exclusive rights thereunder, and are estopped to deny the validity of said patent, by reason of the following facts:

On or about March 15, 1916, Pacific Concrete Placing Company, a firm of San Francisco, California, was licensed by plaintiff, to use the invention of said patent in the State of [4] California and, under certain conditions, was empowered by plaintiff to grant sublicenses to use the invention of said patent in the State of California, but not elsewhere. Prior to March 15, 1916, defendants unlawfully and wrongfully constructed two machines embodying the invention of said patent and were using or preparing to use said machines in the construction of the so-called "Twin Peaks Tunnel" located in the City and County of San Francisco, California. Defendants, being advised that said machines were infringements of said patents, on or about March 15, 1916, entered into a written contract with said Pacific Concrete Placing Company. By said contract defendants recognized the validity of said patent and plaintiff's ownership thereof, and secured the right and license to use said two machines in connection with said "Twin Peaks Tunnel" but not otherwise. In said contract defendants agreed, *inter alia,* that they would not, without the written

consent of the Pacific Concrete Placing Company (and said consent never was given), use said machines, or either of them, upon any other work than said Twin Peaks Tunnel, and defendants further agreed that, upon the completion of the work at the said Twin Peaks Tunnel, said machines were to become the property of Pacific Concrete Placing Company and were to be delivered by defendants to Pacific Concrete Placing Company. Said contract is still in force and effect. All of the obligations of plaintiff and Pacific Concrete Placing Company, under said contract, have been performed but said contract is executory on the part of defendants. Defendants still retain possession of said machines.

(6) In violation of plaintiff's rights under said patent No. 1,127,660, and without any authority, within six years prior to the amendment of this suit, within the Western District of [5] Washington, and elsewhere in the United States, defendants have infringed plaintiff's exclusive rights granted by said patent, and more particularly have infringed Claims 1, 2, 17, 18, 20, 22, 23, 24, 25, 27, 28, 29, 30, 34, and 35 thereof, as follows, to wit:

(a) By making and (or) using and (or) selling apparatus embodying said patented invention.

(b) By using one or both of the machines mentioned in paragraph 5 hereof in the construction of a tunnel forming part of the so-called "Skagit River Project" located near Rockport, State of Washington.

(c) By using at said tunnel forming part of said Skagit River project other machines embodying said patented invention.

Defendants continue to make, use and sell infringing machines in violation of plaintiff's rights, and in infringement of said patent, whereby plaintiff has been, and is being, greatly and irreparably damaged and whereby defendants have obtained, and are obtaining, large profits which in equity belong to plaintiff, the amount of which damage and profits cannot be ascertained except by an accounting.

Plaintiff, therefore, prays:

(a) That defendants be required to answer this bill of complaint, but not under oath, answer under oath being hereby expressly waived.

(b) That the Court grant a preliminary injunction pending this suit and a perpetual injunction restraining defendants, their agents, employees and confederates from making, using or vending devices embodying said patented invention, and from offering or advertising so to do, and from aiding or abetting or in any way contributing to the infringement of said patent. [6]

(c) That this cause be referred to a Master to make and report an account of damages and profits accruing from defendant's infringement of said patent, and that plaintiff have judgment for the damages and profits so found and for the costs of this suit.

(d) That plaintiff have such other and further relief as equity may require.

CONCRETE MIXING AND CONVEYING COMPANY,

By EDWARD WRAY,
President.

BATTLE, HULBERT,
GATES & HELSELL,
901 Alaska Bldg., Seattle,
LYON A. WILLIAMS,
ALBERT G. M. WEBB,
Of Counsel.

State of Illinois,
County of Cook,—ss.

On January 23d, 1924, at Chicago, Illinois, before me personally appeared Edward Wray, who being first duly sworn, testified that he is the President of Concrete Mixing and Conveying Company, the plaintiff named in the foregoing bill of complaint; that he signed the same as such officer; and that he has read the bill of complaint and believes the allegations thereof to be true.

[Seal] (Sgd.) J. DAVID DICKMAN,
Notary Public. [7]

[Title of Court and Cause.]

MOTION TO STRIKE.

Now come the defendants and move the Court to strike out paragraph 5 of the bill of complaint:

(1) Because said paragraph alleges matter irrelevant and impertinent to the issues of the bill, in that it sets out the terms of a license agreement, pleading conclusions of law that the same license agreement is now in force and effect and thereby rendering uncertain the issue of the bill of complaint, which otherwise is drawn as a bill for infringement of a patent; and

(2) Because said paragraph 5 does not set forth ultimate facts:

WHEREFORE, defendants pray for an order from the Court striking said paragraph.

CHADWICK, McMICKEN, RAMSEY & RUPP,

By G. WRIGHT ARNOLD.

G. WRIGHT ARNOLD,

Solicitors for Defendants.

Service of within motion to strike and receipt of copy admitted this 18th day of April, 1924.

WILLIAMS, BRADBURY, McCALEB & PIERCE and

BATTLE, HULBERT, GATES & HELSELL,

Attorneys for Plaintiff.

Filed Apr. 18, 1924. [8]

[Title of Court and Cause.]

ORDER GRANTING MOTION TO STRIKE.

This cause coming on for hearing upon the motion of the defendant to strike from the bill of com-

plaint on file herein paragraph five thereof, plaintiff appearing by Messrs. Battle, Hulbert, Gates & Helsell, its attorneys, and defendant appearing by Mr. G. Wright Arnold, its attorney, and the cause having been argued and submitted to the Court—

NOW, THEREFORE, IT IS ORDERED that said motion to strike paragraph five be, and the same is, hereby granted.

To the entry of the foregoing order the plaintiff excepts and its exception is duly allowed.

Done in open court this 23 day of May, 1924.

JEREMIAH NETERER,
Judge.

O. K. as to form.

G. WRIGHT ARNOLD.

Filed May 23, 1924. [9]

[Title of Court and Cause.]

ANSWER.

To the Honorable Judge of the District Court of the United States for the Western District of Washington, Northern Division.

In answer to the bill of complaint defendant says:

I.

That they are not informed, save by the said bill of complaint, whether the plaintiff is a corporation organized and existing under and by virtue of the laws of the State of Illinois having its principal place of business at Chicago, County of Cook, State of Illinois, and therefore deny the same.

II.

Deny upon information and belief that they have at any time committed, or are committing, any infringement upon any letters patent of plaintiff within said Western District of Washington or elsewhere.

III.

Deny upon information and belief that prior to January 14, 1907, or at any time, John H. McMichael was an original or first or sole inventor of any new or useful improvements in Method of and Apparatus for Transporting and Treating Concrete. Defendant admits that letters patent of the United States No. 1,127,660 were issued February 9, 1915, upon an application of the said [10] McMichael, but whether said patent was duly applied for or granted according to law, defendant is not informed save by said bill, and, therefore, denies that there was secured to the said John H. McMichael or to his heirs at law any exclusive right to make, use and vend the alleged invention known as improvements in Method of and Apparatus for Transporting and Treating Concrete throughout the United States and the territories thereof. Defendant further answering denies that the said bill of complaint sets forth with that degree of particularity required by the provisions of sections 4886 and 4887 of the Revised Statutes of the United States, that patent No. 1,127,660 is good or valid or that all of the requirements of the Statutes have been complied with in securing the issuance of said patent; denies that said patent No. 1,127,660 is good

or valid in law, denies that the alleged invention thereof was novel or required invention for its production, denies that it contained patentable novelty, denies that it was not known or used by others in this country before the alleged invention or discovery thereof by the said McMichael, denies that it was not patented or described in any printed publication in this or any foreign country before his alleged invention or discovery thereof, or more than two years before his application for patent therefor, denies that it was not in public use or on sale in this country for more than two years prior to his said application, denies that it was not patented by him or his legal representatives in any foreign country on an application filed by him or them more than twelve months prior to the filing of said application in this country, and denies that said alleged invention had not been abandoned by him.

IV.

Denies each and every allegation in paragraph 3. [11] Defendant is not informed, save by said bill of complaint, whether the plaintiff is and always has been the sole owner of said United States letters patent No. 1,127,660 and of all rights of action for infringement thereof, and therefore denies the same.

V.

Denies each and every allegation in paragraph 6, provided further nothing in this answering paragraph contained shall be construed as admitting directly or indirectly for any purpose or purposes whatsoever the existence of paragraph 5 of the bill

of complaint of the plaintiff, which paragraph 5 has heretofore been stricken as per order of record, and particularly denies that defendant continues to make, use and sell infringing machines in violation of plaintiff's rights and infringement of said patent No. 1,127,660, and denies that plaintiff has been, and is being, greatly and irreparably damaged, and denies that defendant is obtaining and has obtained large profits which inequity belong to plaintiff, the amount of which damage and profits cannot be ascertained except by accounting, provided further nothing in this answering paragraph contained shall be construed as admitting directly or indirectly for any purpose or purposes whatsoever the existence of paragraph 5 of the bill of complaint of the plaintiff, which paragraph 5 has heretofore been stricken as per order of record.

And by way of a FIRST AFFIRMATIVE DEFENSE, defendant avers:

I.

That said patent No. 1,127,660 and particularly claims 1, 2, 17, 18, 20, 22, 23, 24, 25, 27, 28, 29, 30, 34 and 35 thereof, which claims alone are alleged to be infringed in said bill of complaint, are null and void, because the said John H. [12] McMichael is not the original, first or true inventor of the device described and claimed therein, but that the same and all substantial and material parts thereof were long prior to the supposed and alleged invention thereof by the said McMichael, described and/or patented, and/or illustrated in and by the following mentioned prior letters patent:

	Patent No.	Date.	Inventor.
	285,047	Sept. 18, 1883	J. Lewis
	65,149	May 28, 1867	S. W. Wood
	347,196	Aug. 10, 1886	G. Pohle
	599,055	Feb. 15, 1898	S. C. Davidson
	268,305	Nov. 28, 1882	L. L. Smith
	759,750	May 10, 1904	G. Rosenthal
	837,622	Dec. 4, 1906	J. D. James
	267,318	Nov. 14, 1882	J. W. Beach
	279,034	June 5, 1883	L. Smith
	408,201	July 30, 1889	J. S. Wallace
	894,813	Aug. 4, 1908	J. W. Buzzell et al.
	951,754	Mar. 8, 1910	J. W. Buzzell et al.
	179,055	June 20, 1876	F. C. Prindle
	837,113	Nov. 27, 1906	E. Phillips
Brit.	23,594	Oct. 23, 1896	Bothner
"	12,758	June 30, 1894	Trewent
Germ.	18,394		L. Kolsche
	873,345	Dec. 10, 1907	W. L. Canniff
	747,396	Dec. 22, 1903	Neal Farnham
	727,030	May 5, 1903	B. C. Tilghman, Jr.
	609,744	Aug. 23, 1898	C. T. Hennig
	773,665	Nov. 1, 1904	J. D. Murray
	818,776	Apr. 24, 1906	J. D. Murray
[13]			
	730,884	June 16, 1903	L. K. Davis
	864,471	Aug. 27 1907	W. H. Kelly
	531,379	Dec. 25, 1894	J. E. Mathewson
	519,599	May 8, 1894	C. Bloemendal
	276,879	May 1, 1883	M. Randolph
	602,349	Apr. 12, 1898	W. A. McCool
	741,116	Oct. 13, 1903	M. A. DeFrance

Patent No.	Date.	Inventor.
671,303	Apr. 2, 1901	A. G. Warren
791,176	May 30, 1905	F. W. Breidster
274,778	Mar. 27, 1883	J. B. Hyde
327,210	Sept. 29, 1885	W. Westlake
752,598	Feb. 16, 1904	G. M. Schwend
847,270	Mar. 12, 1907	F. M. Wise
758,118	Apr. 26, 1904	F. Sticker
632,147	Aug. 29, 1899	C. S. Robinson

and in various other patents and publications at the present time unknown to defendant but which defendant prays leave to add by way of amendment to this answer as soon as discovered. The above-named patents and any others which may hereafter be found defendant craves leave to produce and exhibit to the Court at any hearing of this case, and desires the same to be considered as annexed to and deemed a part of this answer.

By way of a SECOND AFFIRMATIVE DEFENSE, defendant avers:

II.

That in the state of the art which existed at the time said patent No. 1,127,660 was applied for, it did not require invention to produce the device and method described and claimed in said patent. Defendant further avers that said claims of said patent are narrowed, restricted and limited by reason of admissions of the said McMichael and of his attorney during the prosecution [14] of the application thereof in the Patent Office; that broader claims originally made in said application were re-

jected and that said rejections were acquiesced in by said McMichael, and such broader claims were erased and narrower and more limited and restricted claims inserted, whereby said plaintiff is estopped to ask for any broad construction of the said claims and has abandoned to the public any alleged broad invention originally claimed, and said patent if valid is limited in its scope to every particular detail of construction shown, described and claimed therein, as will appear in the certified copy of the file wrapper and contents, which defendant craves leave to produce and exhibit to the court at any hearing of this case, and desires the same to be considered as annexed to and deemed a part of this answer.

And by way of a THIRD AFFIRMATIVE DEFENSE, defendant avers:

III.

That said patent No. 1,127,660 does not set forth an operative device for constructing a water pressure tunnel, which type of tunnel defendant is constructing and is known as the "Skagit River Project."

And by way of a FOURTH AFFIRMATIVE DEFENSE, defendant avers:

IV.

That said John H. McMichael named in the bill of complaint was not the original, first and/or true inventor of the whole or any substantial part of the things described in the said claims alleged to be infringed of the patent in suit, but that the same of

all substantial parts thereof were old in the art and were commonly known to the public and made, sold and [15] used in the United States long prior to the respective alleged invention of the said McMichael, and were also so known and so used more than two years prior to his application for patent, and were so known to and used by the Ransome Concrete Machinery Company of Dunellen, New Jersey, in 1905.

All of these matters and things defendant is ready and willing to aver, maintain and prove as this Honorable Court may direct, and humbly prays to be hence dismissed with its costs and charges in this behalf most wrongfully sustained.

R. C. STORRIE & COMPANY,
Defendant.

CHADWICK, McMICKEN, RAMSEY & RUPP,
G. WRIGHT ARNOLD,
Solicitors for Defendants.

Service of the within answer and receipt of copy admitted this 28th day of May, 1924.

BATTLE, HULBERT, GATES & HELSELL,
Attorneys for Plaintiff.

Filed May 28, 1924. [16]

[Title of Court and Cause.]

AMENDMENT TO ANSWER.

Come now the defendants above named, by their counsel, and by leave of Court first had and obtained, amend their answer as follows:

Paragraph I of First Affirmative Defense, page 5 of the answer, after "632,147, Aug. 29, 1899, C. S. Robinson," add the following additional patents, publications, prior uses and prior inventions:

Patent No.	Date.	Inventor.
	Jan. 6, 1809	Upham
7,060	Jan. 29, 1850	Potts
45,153	Nov. 22, 1864	Gunning
47,793	May 23, 1865	Brear
80,225	July 21, 1868	Robertson
86,289	Jan. 26, 1869	Duvall
92,985	July 27, 1869	McKinley
99,360	Feb. 1, 1870	Sickels
4,953	June 18, 1872	Sickles (Reissue)
122,498	Jan. 2, 1872	Smith

[17]

140,692	July 8, 1873	Faucett
146,357	Jan. 13, 1874	Prall
147,780	Feb. 24, 1874	Milner
167,384	Sept. 7, 1875	Boeklen
185,216	Dec. 12, 1876	Cranston
204,725	June 11, 1878	Gunning
220,293	Oct. 7, 1879	Knapp
224,197	Feb. 3, 1880	Maguire et al.
233,499	Oct. 19, 1880	Frizell

Patent No.	Date.	Inventor.
240,265	April 19, 1881	Palmer
250,602	Dec. 6, 1881	Thiollier et al.
267,318	Nov. 14, 1882	Beach
273,623	March 6, 1883	Smith
274,103	March 20, 1883	Ayres
274,104	March 20, 1883	Ayres
277,177	May 8, 1883	Von Schmidt
298,990	May 20, 1884	Leedy
300,333	June 10, 1884	Von Schmidt
318,859	May 26, 1885	Bowers
327,307	Sept. 29, 1885	Peters
327,308	Sept. 29, 1885	Peters
338,138	March 16, 1886	Buell
355,251	Dec. 28, 1886	Bowers
371,006	Oct. 4, 1887	Waits
416,180	Dec. 3, 1889	Neukirch
425,624	Apr. 15, 1890	O'Neil
435,142	Aug. 26, 1890	Harris
450,062	April 7, 1891	Estes
461,429	Oct. 20, 1891	Frasch
461,430	Oct. 20, 1891	Frasch
461,431	Oct. 20, 1891	Frasch
[18]		
464,771	Dec. 8, 1891	Harris
468,365	Feb. 9, 1892	Robbins
472,072	April 5, 1892	Patterson
487,606	Dec. 6, 1892	Church
487,639	Dec. 6, 1892	Pohle
491,843	Feb. 14, 1893	Kauser
495,359	April 11, 1893	McClave
497,427	May 16, 1893	Hussey & Harsen

Patent No.	Date.	Inventor.
501,215	July 11, 1893	Schubert
521,883	June 26, 1894	Holland
523,838	July 31, 1894	Hussey
526,529	Sept. 25, 1894	Hussey
526,530	Sept. 25, 1894	Hussey
526,531	Sept. 25, 1894	Hussey
526,652	Sept. 25, 1894	Hussey
528,449	Oct. 30, 1894	Staley
542,620	July 16, 1895	Bacon
542,622	July 16, 1895	Bacon
555,704	March 3, 1986	Hussey
555,785	March 3, 1896	Misic & Foster
568,445	Sept. 29, 1896	Kennedy
568,742	Oct. 6, 1896	Church
577,522	Feb. 23, 1897	Wallwork & Wells
587,126	July 27, 1897	McAdams
592,037	Oct. 19, 1897	Young & Shaw
593,013	Nov. 2, 1897	Fisher
593,151	Nov. 2, 1897	Zohe
597,023	Jan. 11, 1898	Saunders
600,703	March 15, 1898	Andrews
601,521	March 29, 1898	Melcher
[19]		
11,675	June 28, 1898	Titus (Reissue)
609,350	Aug. 16, 1898	Jones
619,727	Feb. 21, 1899	Davis
620,414	Feb. 28, 1899	Burger
635,270	Oct. 17, 1899	Rix & Donahoo
636,279	Nov. 7, 1899	Newhouse
646,640	April 3, 1900	Evans
656,994	Aug. 28, 1900	Munn

Patent No.	Date.	Inventor.
660,946	Oct. 30, 1900	Butler
669,192	Mar. 5, 1901	Whisler
669,409	Mar. 5, 1901	Dunn
674,021	May 14, 1901	See
676,128	June 11, 1901	Goldie
676,129	June 11, 1901	Goldie
704,608	July 15, 1902	Young & Shaw
707,840	Aug. 26, 1902	Goldie
715,548	Dec. 9, 1902	Cary
734,773	July 28, 1903	Stuart
738,326	Sept. 8, 1903	Higgins
749,206	Jan. 12, 1904	Limbert
749,488	Jan. 12, 1904	King
758,360	Apr. 26, 1904	Harris
759,100	May 3, 1904	Harris
759,357	May 10, 1904	Edison
759,706	May 10, 1904	Harris
778,878	Jan. 3, 1905	Moir
799,642	Sept. 19, 1905	Frasch
800,127	Sept. 19, 1905	Frasch
810,989	Jan. 30, 1906	Steinert
814,601	March 6, 1906	Harris

[20]

870,620	Nov. 12, 1907	Frasch
958,421	May 17, 1910 (application filed Nov. 2, 1905)	McIlvrid
977,444	Dec. 6, 1910 (application filed October 30, 1903)	Frasch

Patent No.	Date.	Inventor.
988,995	April 11, 1911 (application filed October 30, 1903)	Frasch
Brit. 2,539	1868	Crampton
" 4,400	Dec. 18, 1875	Duckham
" 4,277	1882	
" 8,451	Oct. 13, 1884	Gordon
" 15,348	Dec. 14, 1885	Duckham
" 5,221	1886	Greathead
" 11,346	Aug. 8, 1888	Neukirch
French 5,707	Dec. 8, 1838	Triger
" 322,237	June 19, 1902	Societe des Etablissements S. Grauer & Cie.
German 37,503	Sept. 29, 1885	Poetsch
" 42,513	Feb. 17, 1887	Jeziorsky
" 46,842	July 24, 1888	Neukirch
" 25,355		

PUBLICATIONS.

The Pohlé Air Lift Pump—1893—Catalog—New York.

The Pohlé Air Lift Pump—1894 Catalog—New York.

Engineering & Mining Journal, Dec. 28, 1898 (pages 271 to 278, inclusive), Article by C. A. Stetefeldt.

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"Le Genie Civil," Sept. 21, 1895, Vol. XXVII, No. 21 (p. 327).

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"Construction Capacity and Cost of Operating Dredging Machines of Several Types in Recent Excavations of Large Magnitude," by John Bogart, being communication 3 in Section 2 of the I. X. International Navigation Congress, 1902 (pp. 10 and 11 and also title page).

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"Transactions of the American Society of Civil Engineers," Vol. XXXI, January 1894 (pp. 70 and 71).

"Transactions of the American Society of Civil Engineers," Vol. XXXI, May 1894 (pp. 492 and 493).

Paragraph I of the Fourth Affirmative Defense, page 7 of the Answer, after "Ransome Concrete Machinery Company of Dunellen, New Jersey, in 1905," and the following:

Name.	Residence.	Place of Use.
Edward A. Rix,	San Francisco, Calif.,	At San Francisco, Red Bluff Oroville and Tulare, all in California, and elsewhere in the United States.
Austin Rix,	San Francisco, Calif.,	At San Francisco, Red Bluff Oroville and Tulare, all in California, and elsewhere in the United States.
[26] A. C. Dennis,	San Francisco, Calif.	At Pittsburgh, Pa., Memphis, Tenn., Cincinnati, Ohio, and elsewhere in the United States.
Ohio Connecting Railroad,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Pennsylvania Railroad,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Thos. W. Rodd,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Drake Strattor Co.,	Philadelphia, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Wm. Fowler,	Chicago, Ill.,	At Pittsburgh, Pa., Chicago, Ill., and elsewhere in the United States.
Ingersoll-Sergeant Drill Co.,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
W. L. Saunders,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
Maryland Steel Co.,	Sparrows Point, Maryland,	At Sparrows Point, Md., and elsewhere in the United States.
Union Sulphur Co.,	Sulphur, La.,	At Sulphur, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Wm. R. Keever,	Sulphur, La.,	At Sulphur, La., Crowley, La., and elsewhere in the United States.
Samuel W. Maxwell,	Sulphur, La.,	At Sulphur, La., and elsewhere in the United States.
John L. Henning,	Beaumont, Texas,	At Sulphur, La., and elsewhere in the United States.
Edmund M. Ivens,	New Orleans,	At Sulphur, La., and elsewhere in the United States.
W. M. Duson,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
[27]		
Myron Abbott,	Maringouin, La.,	At Crowley, La., and elsewhere in the United States.
Elmo G. Harris,	Rolla, Missouri,	At Rolla, Missouri, Sulphur, La., Crowley, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Thos. S. Leake,	Chicago, Ill.,	At New Orleans, La., and elsewhere in the United States.
C. E. Akeley,	Chicago, Ill.,	At Chicago, Ill., and elsewhere in the United States.
J. W. Buzzell,	Boston, Mass.,	At Boston, Mass., East Orange, New Jersey, and elsewhere in the United States.
Illinois-Central Railroad Co.,	Chicago, Ill.,	At Chicago, Ill., New Orleans, La., and elsewhere in the United States.
W. H. Larkin, Jr.,	New Haven, Conn.	At Laporte, Indiana, and elsewhere in the United States.
Cockburn Barrow & Machine Company,	Jersey City, New Jersey,	At Jersey City, New Jersey; New York City, New York; and elsewhere in the United States.
Thos. Rodd,	Santa Monica, Calif.	At Pittsburgh, Pa., Memphis, Tenn., Cincinati, Ohio, and elsewhere in the United States.

Name.	Residence.	Place of Use.
R. A. Shailer,	New York City, New York.	At New York City, New York, Boston, Mass., and elsewhere in the United States.
Geo. Pegram,	New York City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
W. C. Merriman,	New York City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
Fred Neubauer,	New York City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
Andred J. Murphy, [28]	Long Island City, New York.	At Boston, Mass., St. Louis, Mo., and elsewhere in the United States.
Thos. P. McCormick,	Detroit, Mich.,	At New York City, New York; Boston, Mass.; and elsewhere in the United States.

Name.	Residence.	Place of Use.
Joseph A. P. Hart,	New York City, New York.	At New York City, New York; Jersey City, New Jersey; and elsewhere in the United States.
H. N. Sanford,	New York City, New York.	At New York City, New York; Jersey City, New Jersey; Boston, Mass.; and elsewhere in the United States.
James McIlvrid,	Jersey City, New Jersey,	At New York City, New York; and elsewhere in the United States.
Wm. Connolly,	Jersey City, New Jersey,	At New York City, New York; Jersey City, New Jersey; and elsewhere in the United States.
George Egan,	Jersey City, New Jersey,	At New York City, New York; Jersey City, New Jersey; and elsewhere in the United States.

Name.	Residence.	Place of Use.
A. C. Irwin,	Chicago, Ill.,	On the Florida East Coast Railway between Miami and Key West, Florida, and elsewhere in the United States.
C. Oberdorf,	St. Augustine, Florida,	On the Florida East Coast Railway between Miami and Key West, Florida, and elsewhere in the United States.
W. S. Greenfield,	San Francisco, Calif.,	At New Orleans, La., and elsewhere in the United States.
Jos. G. Medlenka,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Jac. Frankel,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
John Green,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
Hicklen J. Landers,	Crowley, La.,	At Crowley, La., and elsewhere in the United States. [29]
Philip L. Wilson,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.
Ernest Cotton,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.
George T. Warner,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.

Name.	Residence.	Place of Use.
Richard J. Ring,	Miami, Fla.,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga.; and elsewhere in the United States.
H. C. LePorte,	Jersey City, New Jersey,	At Jersey City, New Jersey, and elsewhere in the United States.
C. H. Crooks,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
A. H. Markwart,	San Francisco, Calif.,	At Pittsburg, Calif., and elsewhere in the United States.
R. B. Muir,	San Francisco, Calif.,	At Fort Madison, Iowa, and elsewhere in the United States.

and by others at present unknown to defendant but whose names and locations defendants pray leave to add by amendment when discovered.

CHADWICK, McMICKEN, RAMSEY & RUPP,
STEPHEN F. CHADWICK,
Solicitors for Defendant.

CHAS. E. TOWNSEND,
WM. A. LOFTUS,
Of Counsel.

Dated: July 7, 1927.

Copy of within amendment to answer received this 7th day of July, 1927.

BATTLE, HULBERT & HELSELL,
Attorneys for Plaintiff.

Filed July 7, 1927. [30]

[Title of Court and Cause.]

ORDER DENYING MOTION FOR CONTINUANCE AND DIRECTING DEFENDANT TO FILE BILL OF PARTICULARS.

This matter coming on for hearing before the above-entitled court and the parties hereto, by their respective counsel, having heretofore submitted to the Court in chambers the defendant's motion for continuance herein and the plaintiff's motion for a bill of particulars herein, and the Court having considered said motions and the affidavits herein and the arguments of counsel, and having announced its conclusion,—

NOW, THEREFORE, conformably to the conclusion heretofore announced, it is by the Court CONSIDERED, ORDERED, ADJUDGED AND DECREED that the motion for continuance herein be and the same is hereby denied, to which ruling on the part of the Court the defendant excepts and its exception is hereby allowed.

IT IS FURTHER ORDERED, ADJUDGED AND DECREED that the ruling of the Court upon the motion for continuance is without prejudice to the defendant moving the Court for leave to supplement its record upon trial by the deposition of such witnesses and the submission of such testimony as could not have been obtained at the trial by the exercise of due diligence. [31]

IT IS FURTHER ORDERED, ADJUDGED AND DECREED, upon the consideration of the motion for a bill of particulars herein, that the defendant, on or before the 6th day of September, 1927, make designation in good faith of such United States patents and foreign patents, and such publications, and such prior uses, as will be relied upon by the defendant at the trial of the above-entitled cause, and that such designation be without prejudice to defendant relying upon other United States patents, foreign patents, publications, and prior uses, as may be reasonably shown to be necessary to the proper defense of the above-entitled cause, because of the evidence produced at the trial on the part of the plaintiff herein, and that all matters of cost in connection with the granting of the bill of particulars herein be addressed to the Court at the

time of the trial of the above-entitled cause, to all of which the defendant excepts and its exception is allowed.

Done in open court this 2 day of September, 1927.

JEREMIAH NETERER,
Judge.

O. K. form
CHADWICK, McM. R. & R.,
For Deft.
BATTLE, HULBERT & HELSELL,
Attys. for Plff.

Filed Sep. 2, 1927. [32]

[Title of Court and Cause.]

DEFENDANT'S BILL OF PARTICULARS.

Now comes the defendant above named, and pursuant to order of Court gives the following lists of patents, publications, and prior uses, which as far as it is advised at present, and without prejudice to correction and enlargement or modification, as may develop or as the Court may direct, will offer at the trial either by way of anticipation or to show the state of the art:

UNITED STATES PATENTS.

Patent Number.	Date.	Inventor.
	Jan. 6, 1809	Upham.
7,060	Jan. 29, 1850	Potts.
45,153	Nov. 22, 1864	Gunning.
47,793	May 23, 1865	Brear.
99,360	Feb. 1, 1870	Sickels.
4,953	June 18, 1872	Sickles (Reissue).
122,498	Jan. 2, 1872	Smith.
204,725	June 11, 1878	Gunning.
233,499	Oct. 19, 1880	Frizell.
250,602	Dec. 6, 1881	Thiollier et al. [33]

UNITED STATES PATENTS.
(Continued.)

Patent Number.	Date.	Inventor.
273,623	Mar. 6, 1883	Smith.
274,103	Mar. 20, 1883	Ayres.
298,990	May 20, 1884	Leedy.
327,307	Sep. 29, 1885	Peters.
338,138	Mar. 16, 1886	Buell.
416,180	Dec. 3, 1889	Neukirch.
425,624	Apr. 15, 1890	O'Neil.
240,265	Apr. 19, 1881	Palmer.
472,072	Apr. 5, 1892	Patterson.
487,606	Dec. 6, 1892	Church.
487,639	Dec. 6, 1892	Pohle.
497,427	May 16, 1893	Hussey and Harsen.
523,838	July 31, 1894	Hussey.
526,529	Sep. 25, 1894	Hussey.

Patent Number.	Date.	Inventor.
526,530	Sep. 25, 1894	Hussey.
526,531	Sep. 25, 1894	Hussey.
526,652	Sep. 25, 1894	Hussey.
542,620	July 16, 1895	Bacon.
542,622	July 16, 1895	Bacon.
555,704	Mar. 3, 1896	Hussey.
568,445	Sep. 29, 1896	Kennedy.
568,742	Oct. 6, 1896	Church.
577,522	Feb. 23, 1897	Wallwork and Wells.
597,023	Jan. 11, 1898	Saunders.
635,270	Oct. 17, 1899	Rix and Donahoo.
636,279	Nov. 7, 1899	Newhouse.
646,640	Apr. 3, 1900	Evans.
660,946	Oct. 30, 1900	Butler. [34]

UNITED STATES PATENTS.
(Continued.)

Patent Number.	Date.	Inventor.
669,409	Mar. 5, 1901	Dunn.
676,128	June 11, 1901	Goldie.
671,302	Apr. 2, 1901	Warren.
676,129	June 11, 1901	Goldie.
707,840	Aug. 26, 1902	Goldie.
734,773	July 28, 1903	Stuart.
738,326	Sep. 8, 1903	Higgins.
747,396	Dec. 22, 1903	Farnham
749,206	Jan. 12, 1904	Limbert.
759,100	May 3, 1904	Harris.
799,642	Sep. 19, 1905	Frasch.

Patent Number.	Date.	Inventor.
800,127	Sep. 19, 1905	Frasch.
814,601	Mar. 6, 1906	Harris.
873,345	Dec. 10, 1907	Caniff (Filed Oct. 29, 1906).
870,620	Nov. 12, 1907	Frasch.
958,421	May 17, 1910	McIlvrid (filed Nov. 2 1905).
977,444	Dec. 6, 1910	Frasch (filed Oct. 30, 1903).
988,995	Apr. 11, 1911	Frasch (filed Oct. 30, 1903).
778,878	Jan. 3, 1905	Moir.

BRITISH PATENTS.

4,400	Dec. 18, 1875	Duckham.
8,451	Oct. 13, 1884	Gordon.
15,348	Dec. 14, 1885	Duckham.
5,221	1886	Greathead.
11,456	Aug. 8, 1888	Neukirch. [35]

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Patent Number.	Date.	Inventor.
5,707	Dec. 8, 1838	Triger.
322,237	June 19, 1902	Grauer & Cie.

GERMAN PATENTS.

42,513	Feb. 17, 1887	Jeziorsky.
46,842	July 24, 1888	Neukirch.
18,394	Oct. 16, 1881	Ludwig Kolsche.
37,503	Sep. 29, 1885	Poetsch.

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(Continued.)

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"Zentrallblatt der Bauverwaltung," Oct. 17, 1903, No. XXLLL year, No. 83 (pp. 517 and 518, with illustrations 1 and 2 on p. 516).

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"Le Genie Civil," Sept. 21, 1895, Vol. XXVII, No. 21 (pp. 327 to 329, inclusive).

"Tunnel Shields," by William Charles Cowperthwait, 1905 (Fig. 56, pp. 94 and 95).

Eighth Annual Report of the Boston Transit Commission.

"Engineering News," January 25, 1902 (pp. 74, 75 and 76).

"Cockburn Barrow Machine Co. "Catalogue C," Jersey City, N. J., U. S. A. (particularly p. 100).

"Engineering News," January 9, 1902, Vol. XLVII, part 2 (pp. 35 and 36).

"Engineering News," February 6, 1902, Vol. XLVII, No. 6 (p. 113).

"Transactions of the American Society of Civil Engineers," Vol. XXIX, Sept. 1893 (p. 639 to p. 643, inclusive, together with Plats No. 1, illustrative of the article).

"Transactions of the American Society of Civil Engineers," Vol. XXX, December 1893 (pp. 579 to 583, inclusive).

"Engineering Record," March 12, 1904 (pp. 329, 330 and 331). [39]

PUBLICATIONS.
(Continued.)

"Engineering Record," Mar. 4, 1905 (pp. 232 to 235, inclusive).

"Engineering News," Mar. 7, 1891, Vol. XXV, No. 10 (pp. 200 and 221).

"Engineering News," Sept. 12, 1895, Vol. XXXIV, No. 11 (p. 163).

"Le Genie Civil," Sept. 21, 1895, Vol. XXVII, No. 21 (p. 327).

"Le Genie Civil," Dec. 29, 1900, Vol. XXXVIII, No. 9 (p. 145).

"Construction Capacity and Cost of Operating Dredging Machines of Several Types in Recent Excavations of Large Magnitude," by John Bogart, being communication 3, in Section 2 of the I. X. International Navigation Congress, 1902 (pp. 10 and 11 and also title page).

"Engineering News," June 13, 1895 (Illustration appearing opposite page 378 and also pp. 379 and 380).

"Engineering News," June 13, 1895 (pp. 384, 385, 386 and 387).

"Engineering Record," Jan. 6, 1900 (pp. 2, 3, and 4).

"Transactions of the American Society of Civil Engineers," Vol. XXXI, January 1894 (pp. 70 and 71).

"Transactions of the American Society of Civil Engineers," Vol. XXXI, May 1894 (pp. 492 and 493).

PRIOR INVENTION AND PRIOR USE.

Name.	Residence.	Place of Use.
Edward A. Rix,	San Francisco, California,	At San Francisco, Red Bluff, Oroville and Tulare, all in California, and elsewhere in the United States.
A. C. Dennis,	San Francisco, California,	At Pittsburgh, Pa., Memphis, Tenn., Cincinnati, Ohio, and elsewhere in the United States.

[40]

PRIOR INVENTION AND PRIOR USE.
(Continued.)

Name.	Residence.	Place of Use.
Ohio Connecting Railroad,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.
Thos. W. Rodd,	Pittsburgh, Pa.,	At Pittsburgh, Pa., and elsewhere in the United States.

Name.	Residence.	Place of Use.
W. L. Saunders,	New York City, New York,	At New York City, New York, and elsewhere in the United States.
Union Sulphur Co.,	Sulphur, La.	At Sulphur, La., and elsewhere in the United States.
Wm. R. Keever,	Sulphur, La.,	At Sulphur, La., Crowley, La., and elsewhere in the United States.
Samuel W. Maxwell,	Sulphur, La.,	At Sulphur, La., and elsewhere in the United States.
Edmund M. Ivens,	New Orleans,	At Sulphur, La., and elsewhere in the United States.
Thos. S. Leake,	Chicago, Ill.,	At New Orleans, La., and elsewhere in the United States.
J. W. Buzzell,	Boston, Mass.,	At Boston, Mass; East Orange, New Jersey, and elsewhere in the United States.

Name.	Residence.	Place of Use.
Illinois-Central Railroad Co.,	Chicago, Ill.,	At Chicago, Ill., New Orleans, La., and elsewhere in the United States.
W. H. Larkin, Jr.,	New Haven, Conn.,	At LaPorte, Indiana, and elsewhere in the United States.
Cockburn Barrow & Machine Company,	Jersey City, New Jersey,	At Jersey City, New Jersey; New York City, New York, and elsewhere in the United States.
R. A. Shailer,	New York City, New York,	At New York City, New York, Boston, Mass., and elsewhere in the United States.
Thos. P. McCormick,	Detroit, Mich.,	At New York City, New York, Boston, Mass., and elsewhere in the United States.

PRIOR INVENTION AND PRIOR USE.
(Continued.)

Name.	Residence.	Place of Use.
James McIlvrid,	Jersey City, New Jersey,	At New York City, New York, and elsewhere in the United States.
W. S. Greenfield,	San Francisco, California,	At New Orleans, La., and elsewhere in the United States.
Jos. G. Medlenka,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Jac. Frankel,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.

Name.	Residence.	Place of Use.
John Green,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Hicklen J. Landers,	Crowley, La.,	At Crowley, La., and elsewhere in the United States.
Phillip L. Wilson,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.
Ernest Cotton,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.

Name.	Residence.	Place of Use.
George T. Warner,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.
Richard J. Ring,	Miami, Florida,	On the Florida East Coast Railway, Key West Extension, Fla.; Savannah, Ga., and elsewhere in the United States.
H. C. LaPorte,	Jersey City, New Jersey,	At Jersey City, New Jersey, and elsewhere in the United States.
C. H. Crooks,	New York City, New York,	At New York City, New York, and elsewhere in the United States.

PRIOR INVENTION AND PRIOR USE.
(Continued.)

Name.	Residence.	Place of Use.
A. H. Markwart,	San Francisco, California.	At Pittsburgh, Calif., and elsewhere in the United States.
R. B. Muir,	San Francisco, California.	At Ford Madison, Iowa, and elsewhere in the United States.

and possibly others.

CHARLES E. TOWNSEND,
CHADWICK, McMICKEN, RAMSEY & RUPP,
Attorneys for Defendants.

Service of copy of the within defendants' bill of particulars admitted this —— day of September, A. D. 1927.

_____,

For Plaintiff.

Filed Sep. 6, 1927. [43]

[Title of Court and Cause.]

DEFENDANTS' DEMAND UNDER EQUITY RULE 58 THAT PLAINTIFF ADMIT IN WRITING THE GENUINENESS OF PUBLICATIONS.

To Concrete Mixing and Conveying Company, and to *to* Battle, Hulbert, Gates & Helsell, and to Messrs. Williams, Bradbury, McCaleb & Hinkle, Its Solicitors and Counsel:

Come now the defendants above named and, under Equity Rule 58, make demand of the plaintiff above named that plaintiff admit:

1. The genuineness of the patents and publications listed in our bill of particulars served this day on counsel for plaintiff;

2. That the dates of issuance of said patents, United States and Foreign, and the dates of application of the said United States patents appearing on the printed or photostat copies thereof are true and correct, subject to correction if error found;

3. That the dates of publication and the name of the publisher or author, of the said several publications, are correct;

4. That the photostat copies of such publications or portions thereof and heretofore offered in evidence in connection with the New York depositions in the cases of this plaintiff vs. Great Western Power Company, In Equity—No. 1804, pending in the United States District Court for the Northern District of California, Southern Division; and of the Plaintiff vs. Stone & Webster, Incorporated, Equity—No. 2747, pending in the United States District Court, District of Massachusetts, and duplicates of which photostats have heretofore been furnished counsel for plaintiff, are true and correct copies of the originals of the [44] pages of such publications or portions thereof as purported.

If such admissions be not made within five (5) days from service hereof, defendant will move the Court for costs of proving said patents, publications, and documents, irrespective of the outcome of the suit.

R. C. STORRIE & COMPANY (a Partnership).

By CHARLES E. TOWNSEND,

CHADWICK, McMICKEN, RAMSEY & RUPP,

Its Attorneys.

[Endorsed]: Copy received.
Date Sept. 6, 1927.
BATTLE, HULBERT & HELSELL,

[Endorsed]: Filed Sep. 6, 1927. [45]

[Title of Court and Cause.]

NOTICE AND INVITATION OF DEFENDANT TO WITNESS TESTS.

To Concrete Mixing & Conveying Company, a Corporation, and to Williams, Bradbury, McCaleb and Hinckle, and to Carey Van Fleet, Esq., and Battle, Hulbert & Helsell, Its Attorneys.

You are hereby advised that on Wednesday, September seventh, 1927, at 4:00 P. M., a series of tests in the handling of various cementitious mixtures, including concrete, by compressed air, will be run at the East Portal of Sunset Tunnel, Municipal Railways Project, in the City and County of San Francisco, California. The evidence, testimony, and results of said tests and the machines there and then to be used will be adduced and used in connection with the *trail* or *trails* of one or the other or all of the following suits based on the McMichael patent No. 1,127,660 of February 9th, 1915, and brought by said Concrete Mixing and Conveying Company, and now pending, to wit:

"In the District Court of the United States, for the Western District of Washington, Northern Division.

CONCRETE MIXING & CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Defendant.

IN EQUITY—No. 394."

"In the United States District Court, for the Northern District of California, Division Three.

CONCRETE MIXING & CONVEYING COMPANY,

Plaintiff,

vs.

GREAT WESTERN POWER COMPANY OF CALIFORNIA,

Defendant.

IN EQUITY—No. 1804." [46]

"In the United States District Court, for the District of Massachusetts.

CONCRETE MIXING & CONVEYING COMPANY,

Plaintiff,

vs.

STONE AND WEBSTER, INCORPORATED,

Defendant.

IN EQUITY—No. 2747."

You and plaintiff's experts are invited to be present and to witness said tests.

CHAS. E. TOWNSEND,
Attorney for the Foregoing Defendants.
CHADWICK, McMICKEN, RAMSEY & RUPP.

[Endorsed]: Copy received.
Dated Sept. 3, 1927.
BATTLE, HULBERT & HELSELL.

[Endorsed]: Filed Sep. 6, 1927. [47]

[Title of Court and Cause.]

ORDER SETTLING STATEMENT OF PROCEEDINGS AND NARRATIVE OF TESTIMONY.

This cause coming on for hearing this 14th day of February, 1928, upon the motion of the plaintiff for an order approving the statement of proceedings and narrative of testimony given at the trial of the above-entitled action and upon the proposed amendments, additions and objections of the defendant thereto; the plaintiff and defendant being represented by their respective solicitors,—

NOW, THEREFORE, IT IS ORDERED that copies of the depositions of William Keever, S. W. Maxwell, Nicklen J. Landers, John Green, Joseph G. Menlenka, Jac. Frankel, Edmund F. Ivens, Will-

iam H. Larkin, and Thomas S. Leake, in the exact language of the witnesses, be certified by the Clerk of this court and sent to the Circuit Court of Appeals at San Francisco, California, as a part of the record on appeal herein.

That the amendments proposed by the defendant be allowed and made a part of the said narrative of testimony with the following changes and exceptions:

The last paragraph of the first proposed amendment [48] be changed to read as follows:

> "Mr. WILLIAMS.—We have elected to rely upon a somewhat less number of the claims of the patent in suit than are set up in our bill of complaint. We shall rely upon claims 1, 2, 17, 18, 24, 29, 34 and 35 of this patent."

In lieu of the amendment after line 26, page 1, insert the following between lines 26 and 27:

> "Plaintiff's Exhibit No. 4 objected to as not pertinent and not competent. Objection overruled and exception noted."

In lieu of the amendment in line 7, page 2, insert the following between lines 6 and 7, page 2:

> "Defendant objected to plaintiff's Exhibit No. 10 as not pertinent and not competent. Objection overruled and exception noted."

The amendment to line 26, page 6, be allowed and there be added to the same the following:

> "The above question objected to as not germaine and objections sustained.

That from line 14, on page 22, to the end of line 16, on page 22, be stricken and the following inserted:

"Q. Now, when you first learned of this McMichael apparatus and method, were you in a position where the matter was presented to you for your consideration on behalf of a contracting concern? A. Yes, sir.

Mr. TOWNSEND.—Objected to as irrelevant and immaterial.

Mr. WILLIAMS.—This is merely preliminary.

The COURT.—Overruled. Proceed to what is material."

That the balance of the amendment proposed on page 22 be omitted.

That the proposed amendment on page 27 be allowed and that there be inserted prior to said amendment, the following words:

"Q. What, approximately, is the weight of a cubic yard of concrete? A. About two tons."

That the proposed amendment to strike out a portion of page 55 be denied.

That the proposed amendment in lines 22 and 23, page 56, be changed to read as follows:

Insert "Over objection that no proper foundation was laid, witness testified; 'properly mixed concrete forming materials do not have the quality of flowing as do liquids.'"

The statement by Mr. Townsend on page 12-g of the proposed amendment be omitted.

That the proposed amendment in line 20, page 206, line 8 page 216, line 5 page 249, be denied.

That in lieu of all amendments proposed from line 15, page 251 to line 30 on page 255, substitute the exact testimony given by question and answer as shown from line 24 at page 439 to the end of the testimony on page 448 of the transcript of testimony. [49]

In lieu of the amendments proposed from line 19, page 257, to line 1, page 264, substitute the testimony given by question and answer as shown in the transcript of the testimony from line 11, page 451, to the end of the testimony on page 470.

The amendment proposed after line 16, on page 266, is denied.

The first six lines of the proposed amendment after line 23, page 266 be allowed; the balance of said proposed amendment be denied.

In lieu of all amendments from line 24, page 270 to line 15, page 273, there be substituted all of the testimony by question and answer shown in the transcript of testimony from line 30, page 520, to the end of the testimony at page 525.

The proposed amendment in line 12, line 18 and line 19, page 280, be allowed.

That the proposed amendments in line 27 and line 30, page 280 be denied.

That the proposed amendment to line 5 in page 281 and to lines 5 to 10, page 284 be denied.

That the proposed amendment to strike out a portion from line 21 on page 284 to line 1 on page 285 be denied.

That the proposed amendment after line 13, at page 285 be denied.

In lieu of the proposed amendment to strike out a portion of page 285 from line 20 to line 30, inclusive, be denied and there be substituted in lieu thereof the testimony given by question and answer as shown in the transcript of testimony from line 21, page 545 to line 22, page 546.

The proposed amendment in line 2, page 286 be denied.

That the proposed amendments in lines 7, 17 and 24, page 286 be allowed.

That the proposed amendment to strike out from lines 3 to 5 on page 288 be denied.

That the proposed amendment to strike out from line 17 on page 302 to line 27 on page 303 be denied.

That the amendment to strike out from line 3 to line 14 on page 305 be allowed and that there be added thereto, at the end, the following:

"A. Yes, sir."

The proposed amendment after line 16, page 305 be denied.

The proposed amendment to strike out from line 20 on page 305 to line 5 on page 306 be denied. [50]

The proposed amendment to strike out from line 19 to line 24 on page 307 be denied.

That the proposed amendment after line 24, page 311, be allowed and there be added to said amendment, at the end thereof, all of the statements of counsel from line 29 on page 583 to line 21 on page 584 of the transcript of testimony.

Entered.

BOURQUIN,
District Judge.

[Endorsed]: Filed Feb. 14, 1928. [51]

[Title of Court and Cause.]

NOTICE RE FILING PRAECIPE AND FILING STATEMENT OF TESTIMONY.

Messrs. Chadwick, McMicken, Ramsey & Rupp,
Attorneys for Defendant,
Seattle, Washington.

Gentlemen:

Please be informed that the plaintiff has this day filed a praecipe in the above-entitled cause and has prepared and this day lodged with the Clerk of the United States District Court at Seattle, Washington, for your examination, a statement, largely in narrative form, of the testimony and depositions specified in such praecipe.

Also please take notice that on January 18, 1928, at 10:00 o'clock A. M., or as soon thereafter as counsel can be heard, we shall ask the Court to approve the said statement of the evidence and to enter an order in the form hereunto annexed.

WILLIAMS, BRADBURY, McCALEB & HINKLE,
BATTLE, HULBERT & HELSELL,
Counsel for Plaintiff.

Seattle, Washington, January 7, 1928.

Received a copy of the above notice and copies of the therein mentioned praecipe and draft order this 7th day of January, 1928.

WM. A. LOFTUS,
CHARLES E. TOWNSEND,
S. F. CHADWICK,
Counsel for Defendants.

Filed Jan. 7, 1928. [52]

[Title of Court and Cause.]

STATEMENT OF PROCEEDINGS BEFORE JUDGE BOURQUIN, AND NARRATIVE OF TESTIMONY.

BE IT REMEMBERED, That heretofore and on, to wit, September 13, 1927, at the hour of ten o'clock A. M. the above-entitled cause came on regularly for hearing in the above-entitled court and before the Honorable George W. Bourquin, sitting without a jury. The plaintiff appearing by Lynn A. Williams, Esq., C. C. Bradbury, Esq., and A. G. McCaleb, Esq. (of Messrs. Williams, Bradbury, McCaleb & Hinkle), and Frank P. Helsell, Esq. (of Messrs. Battle, Hulbert & Helsell), its attorneys and counsel; the defendant appearing by Charles E. Townsend, Esq., and William A. Loftus, Esq. (of Messrs. Townsend, Loftus & Abbett), and Stephen F. Chadwick, Esq. (of Messrs. Chadwick, McMicken, Ramsey & Rupp), its attorneys and counsel.

Mr. WILLIAMS.— . . . We have elected to reply upon a somewhat less number of the claims of the patent in suit than are set up in our bill of complaint. We shall rely upon claims 1, 2, 17, 18, 24, 29, 34 and 35 of this patent.

After statements to the Court, Mr. Lynn A. Williams, for plaintiff, and Mr. Charles E. Townsend, for defendant, the following [53] exhibits were received in evidence in behalf of the plaintiff:

(1) A certified copy of articles of incorporation of the plaintiff company as Plaintiff's Exhibit No. 1.

(2) A certificate of good standing of the plaintiff company as Plaintiff's Exhibit No. 2.

(3) A certified copy of letters patent in suit to McMichael No. 1,127,600, as Plaintiff's Exhibit No. 3.

(4) The entire record in the suit of Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation, as Plaintiff's Exhibit No. 4.

Plaintiff's Exhibit No. 4 objected to as not pertinent and not competent. Objection overruled and exception noted.

(5) A certified copy of the opinion of Judge Learned Hand in Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation, as Plaintiff's Exhibit No. 5.

(6) A certified copy of the opinion of Judge Augustus N. Hand in Concrete Mixing & Conveying Company vs. Ulen Contracting Corporation, as Plaintiff's Exhibit No. 7. [54]

(7) A certified copy of the decree in Concrete Company vs. Ulen was admitted in evidence as Plaintiff's Exhibit No. 8.

(8) A certified copy of the Mandate of the Court of Appeals in Concrete vs. Ulen was admitted in evidence as Plaintiff's Exhibit No. 9.

(9) A certified copy of the decree on the Mandate in Concrete vs. Ulen was admitted in evidence as Plaintiff's Exhibit No. 10.

Defendant objected to Plaintiff's Exhibit No. 10 as not pertinent and not competent. Objection overruled and exception noted.

(10) The entire record in the case of Concrete Mixing & Conveying Company vs. Powers-Kennedy Company was admitted in evidence as Plaintiff's Exhibit No. 11.

TESTIMONY OF ROY C. HACKLEY, FOR PLAINTIFF.

ROY C. HACKLEY, plaintiff's witness.

My name is Roy C. Hackley. I am 47 years of age, and reside at Berkeley, California. I am a construction engineer. I am interested in the business of selling or leasing apparatus for the pneumatic placing of concrete. I saw the apparatus used by R. C. Storrie & Company in lining the Skagit River tunnel. I designed that apparatus and installed it or superintended its installation. I saw it in operation. I continued to work on the Skagit job until the completion of the contract. I

(Testimony of Roy C. Hackley.)

did not have anything to do with the designing of a pneumatic concrete placing apparatus which was employed by this same R. C. Storrie & Company in connection with the Twin Peaks job in California. I saw the pneumatic placing equipment which was used by R. C. Storrie & Company on the Twin Peaks job. A portion of the apparatus which was used by R. C. Storrie & Company on the Twin Peaks job was also employed in the Skagit River job, that is to say, one of the concrete guns or placers which had been used on the Twin Peaks job was used on the Skagit River job. [55]

The apparatus which the Storrie Company first used on the Twin Peaks job, and subsequently used on the Skagit River job, was a vertical container which held about ten cubic feet of mixed concrete. It had a door at the top to close it, an air intake near [56] the top and two air pipes leading to the elbow at the bottom of the container. This apparatus was used on the Skagit job at the beginning, but was later discontinued.

Having had called to my attention a certified copy of an application for United States patent, filed on March 26, 1924, by Roy C. Hackley, Serial No. 702,056, I say that I am the Roy C. Hackley who executed and filed such application for United States patent.

Q. Now, I call your attention particularly to the certified copy of a so-called cancelled drawing in the matter of that application and to the first photographic reproduction of a drawing as it ap-

(Testimony of Roy C. Hackley.)

pears in this certified copy of the file-wrapper and also to the specification of this application for patent, beginning on line 29 of page 5, and ending on line 13 of page 8 of the specification, and I ask you whether these illustrate and describe the apparatus which you say you designed and which was used by the defendant R. C. Storrie Company on this Skagit River project?

A. Yes, that is correct.

Q. Now, did all of the detail of the apparatus as used on the Skagit River job by Storrie & Company correspond exactly with what is shown in your patent application drawing? I ask particularly relative to the point at which the air-pipes enter the chambers. Do they enter at the end or enter at the sides?

A. They enter at the end and at different points on the bottom.

Q. This patent drawing shows they all enter at the end, does it not?

A. No, it does not. [57]

Q. Can you point to one here shown as entering somewhere other than at the end?

A. One end is there and one there and one in here.

Q. The end you say—the end, as you say, but they enter, do they not, all of them, in this patent drawing—

A. (Interrupting.) They enter at the end, yes, but they enter there at those points.

Q. In the apparatus as employed on the Skagit

(Testimony of Roy C. Hackley.)

River Tunnel do they all enter at the end in that fashion (indicating) or in some other way?

A. In the first one they entered at those points—they entered at the bottom—

Q. (Interrupting.) They entered or ended?

A. The air left the pipe at the same points.

Q. I am asking you where the pipes entered into the chamber. Did they enter at the end, as shown on this patent drawing, or did they enter the chamber at the side?

A. On the first tried machine they entered at the end and on the bottom.

Q. Some on the bottom?

A. Yes, sir, some on the bottom—those same points.

Q. Will you look at this drawing and state whether this correctly represents the arrangement of the pipes and particularly the way in which they enter the chamber in the apparatus as used on the Skagit River project?

A. Your pipe is incorrect.

Q. The one which is marked 27-A?

A. That pipe is incorrect (indicating). That pipe is incorrect (indicating.) And that pipe is incorrect—the location.

Q. Wasn't there in that apparatus a pipe which was cast at the end at this point? [58]

A. No, there was not, marked 29.

Q. Marked 29, yes.

A. No, there was not.

(Testimony of Roy C. Hackley.)

Q. And you say that there was no pipe corresponding with the one marked 27–A?

A. That pipe did not enter that way.

Q. How did it enter?

A. This pipe entered at the end (indicating) and this pipe entered at the bottom in a similar manner to that. It was not a right angle.

Q. Is the illustration of the manner in which pipe 26–A enters substantially correct?

A. Substantially correct, yes. There was an angle there. It did not have that direct right angle.

Q. More of a bend in there?

A. More of a bend in there.

Q. Was there more than one of these apparatuses employed on the Skagit River Project, that is, apparatus that you designed?

A. Yes, there were several.

Q. There were several? A. Yes, sir.

Q. Were they all identically alike?

A. The principle was the same in all of them.

Q. But the bends and ends in those things differed—

A. (Interrupting.) That was only used a very short time.

Q. This one, as shown here (indicating)?

A. Yes, sir.

Q. Subsequently the air pipes all came in from the end?

A. Subsequently the air pipes all came in from the end. They came in through the end, but they

(Testimony of Roy C. Hackley.)

terminated at the same point that they show there. [59]

Q. That is, after the first one—

A. (Interrupting.) They terminated—they came in through the end but they terminated at the same point that they show there.

Q. After the first—

A. (Interrupting.) They terminated as shown on the patent drawing.

Q. In all the machines they so terminated, didn't they? A. Yes, sir.

Q. That is, the pipes corresponding with those marked on this last drawing 27–A, 26–A, 25–A, there were such pipes in all of the several placers but the method in which they were led in differ in the successive machines.

A. Yes, sir. This led in so that the air came directly on a line with the bottom of each one.

Q. Do you attribute any difference in mode of operation to those slight differences which you alluded to? A. No; no difference.

Mr. WILLIAMS.—We offer in evidence the portions of the Hackley file-wrapper and drawings identified by the witness—that would be the petition, the oath, the specification as originally filed, the first drawing and the cancelled drawing. We ask that they be marked as Plaintiff's Exhibit No. 12.

Mr. TOWNSEND.—That is objected to, your Honor, for the reason that they are bringing in the entire file of proceedings of the Patent Office in

connection with a patent that is not the patent in suit. A plain copy of the patent as finally issued would serve the purpose. This only serves to encumber the record and increase the cost.

The COURT.—What is the object? [60]

Mr. WILLIAMS.—Well, counsel were very careful to offer not the entire file-wrapper, but a limited part of the specifications and drawings which this witness has testified are descriptive of the apparatus used by the defendant.

The COURT.—Upon that statement they will be admitted. Proceed.

(Whereupon the Hackley File was admitted in evidence as Plaintiff's Exhibit 12.)

Mr. WILLIAMS.—And I offer in evidence the large drawing identified by the witness, marked "Defendant's Apparatus," and ask that it be marked Plaintiff's Exhibit 13.

Mr. TOWNSEND.—We object to that as no proper foundation having been laid. We do not know anything about this drawing. The witness has said that it is not a correct drawing of his apparatus.

The COURT.—It will be rejected at this time. Make one, if you can, based upon the witness' testimony.

Mr. WILLIAMS.—I would like to have this drawing that the witness has testified regarding marked for identification as Plaintiff's Exhibit 13.

The COURT.—It may be so marked.

(Whereupon a drawing was identified as Plaintiff's Exhibit 13.)

(Testimony of Roy C. Hackley.)

Cross-examination.

Q. What was the occasion, Mr. Hackley, of getting up that gun?

A. The unsatisfactory working of the gun that we had used at first. The work was unsatisfactory to the engineers in charge of the job for the City of Seattle.

(The above question objected to as not germane and objection sustained). [61]

The old gun was used on the Skagit River for possibly two months. The Hackley gun was used on the Skagit River job until the completion of the contract. That was approximately a year and a half.

TESTIMONY OF R. C. OXENHAM, FOR PLAINTIFF.

R. C. OXENHAM, plaintiff's witness.

My name is R. C. Oxenham. I am 34 years old. I reside at Chicago, Illinois. I was in a tunnel forming part of the gorge plant of the Skagit River project of the city of Seattle, located in the State of Washington, near Rockport, on October 10, 1923. I was accompanied on this visit by Mr. Albert G. McCaleb. R. C. Storrie & Company was doing work on that tunnel. I saw a pneumatic concrete placing apparatus in operation in the tunnel at that time. I have photographs which were taken at the time of my visit and which illustrate what I saw. I produce four of these photographs. These

(Testimony of R. C. Oxenham.)

photographs were taken in my presence. They are flashlight photographs.

(The four photographs marked respectively 14–A, 14–B, 14–C and 14–D were admitted in evidence as plaintiff's exhibits.)

Q. Can you produce a drawing of the machine made by you or at your instance in accordance with your observation made at that time?

A. Yes, sir.

Q. Will you do so. (Witness produces drawing.)

Mr. WILLIAMS.—We offer in evidence the two drawings produced by the witness and ask that they be marked Plaintiff's Exhibits 15–A and B, respectively.

Mr. TOWNSEND.—Objected to as not sufficiently proven.

The COURT.—Interrogate your witness further to see if he is competent—if he made them accurately. [62]

Q. Just tell what you did in examining the apparatus which you saw there at that time.

A. Well, we examined both the exterior and the interior of the machine.

Q. How did you examine the interior.

A. Why, we had the man that was operating the concrete placer machine open up the door. When the door was opened why we examined it by means of our flashlight on the inside and tested the air that was coming out of the different pipes.

Q. Did you see where the various pipes led?

(Testimony of R. C. Oxenham.)

A. Yes, sir.

Q. Where they were directed? A. Yes, sir.

Q. You saw that with your own eyes, did you?

A. Yes, sir.

Q. Did you see the pipe valves? Perhaps you had better name the things that you saw there—just the parts that you saw.

A. Well, we saw the metal chamber and the opening.

Q. What opening do you mean?

A. The opening on the top of the machine whereby they put the concrete in.

Q. Did you see the concrete go in there?

A. Yes, sir.

Q. Was the opening left open?

A. No, not after the concrete was put in. It was closed tight.

Q. Now, what else did you see?

A. We saw the various air pipes.

Q. How many?

A. There were five in all. One was closed.

Q. Which one was closed?

A. No. 29 on there.

Q. How did you determine that? [63]

A. Why, when the top was opened why we put our hand in there and the man turned the valve on and there was no air came out of there. It was capped.

Q. Did you see the pipe from the outside—this capped pipe? A. Yes, sir.

Q. Now, these other pipes on the bottom, how did you observe them?

(Testimony of R. C. Oxenham.)

A. We examined them carefully and saw that some of them extended downwardly and along the side or on the outside of the chamber and entered the chamber at various points along the bottom of the chamber.

Q. Did you determine where they terminated.

A. We did.

Q. Those several pipes?

A. Yes, sir.

Q. By looking at them? A. Yes, sir.

Q. Did you make any notes or memoranda of what you saw at that time? A. Yes, sir.

Q. How soon were these drawings prepared after your examination of the apparatus.

A. Why, I should say about a month; when we got back to Chicago.

Mr. WILLIAMS.—Now, again I offer the drawings. Just let me ask one question.

Q. Do these drawings which you have produced accurately and correctly illustrate what you observed as you have described? A. Yes, sir.

Mr. WILLIAMS.—Again we offer them in evidence and ask that they be marked Plaintiff's Exhibits 15–A and 15–B.

Mr. TOWNSEND.—We object to that. They only represent the opinion of this witness and no proper foundation has been laid. [64]

The COURT.—Let me see them. Are you a draftsman?

(Testimony of R. C. Oxenham.)

A. No, sir.

(By the COURT.)

Q. Did you make these? A. No, sir.

Q. You did not make them? A. No, sir.

The COURT.—I doubt whether they are properly admissible or competent. Of course, the objection is not made on that ground. They will be admitted over objection. If not entitled to consideration the Court will give them none. For the sake of the record counsel's exception will be noted. Proceed. Anything further with the witness?

Mr. WILLIAMS.—I think not.

(The drawings produced by the witness were received in evidence as Plaintiff's Exhibits Nos. 15–A and 15–B.) [65]

Cross-examination.

I am office manager for C. C. Erd & Company—mortgage loans. I was going west on my vacation at the time I visited the Skagit River project. I had had no particular interest in concrete machinery before that time. I had never seen any machines of that sort before that time. I have seen some of these machines since that time. About two and a half yards of concrete was placed in the machine which I saw at the Skagit River project. I say two and a half cubic yards because it looked that way to Mr. McCaleb and me, and then I asked the man that operated the gun and he said it was around two and a half cubic yards. [66]

Q. You took his word for it; is that right?

A. Well, his word and Mr. McCaleb's.

(Testimony of R. C. Oxenham.)

Q. And had that machine been used before that charge was put in that you observed—had it been in use?

A. Yes, they were using the machine when we got up to the tunnel.

Q. Was it within the tunnel or outside?

A. Inside of the tunnel.

Q. How far from the mouth of the tunnel?

A. Approximately halfway up the tunnel.

Q. What distance would that be?

A. One mile.

Q. Was it dark in there?

A. Well, there were electric lights every now and then. You could at least see your way going up the tunnel, and we had a guide with us.

Q. When you looked into the machine or receptacle there with your headlights, how much concrete was in the bottom.

A. Well, when we looked in—he let us look in after the concrete had gone through into the discharge pipe.

Q. Were the sides—was the inside of the receptacle polished and clean or did they have concrete sticking to them?

A. It was kind of watery stuff. It was not what you would call clean.

Q. That was in the bottom?

A. Yes, kind of aggregated down there.

Q. Did you measure any of those pipes at the time yourself? A. No.

(Testimony of R. C. Oxenham.)

Q. You took no measurements, I suppose, at the time? [67]

A. Not of the pipes. I measured the main chamber—stepped it off with our feet the best we could.

Q. Any operation that was given of that machine you accepted as told you by the operators or by Mr. McCaleb?

A. Well, I had a very good idea myself after looking at it just how the machine operated and so forth. I did not take their word for everything.

Q. But you took their word for some things?

A. Some of the technical points, yes, sir.

Q. When the air was turned on, and how it was turned on, and where?

A. Well, we could tell that by the valves there, and also when he let us look inside of the chamber when it was opened.

Q. Who made the sketches that are here?

A. They were made in Mr. McCaleb's office.

TESTIMONY OF ROY C. HACKLEY, FOR PLAINTIFF (RECALLED).

ROY C. HACKLEY, recalled for plaintiff.

Q. Mr. Hackley, will you look at these photographs that Mr. Oxenham produced and state whether they appear to represent the apparatus designed by you, or one of the apparatuses designed by you and used in the Skagit Tunnel by R. C. Storrie & Company. Just say whether it does or not. A. It does.

(Testimony of Roy C. Hackley.)

Q. Are those proper photographs of this apparatus? A. They appear so to me.

Q. Better take the chair. Let me call your attention particularly to what appears to be a pipe leading in at the end of the chamber which point on this photograph is marked 25 in red. A. Yes. [68]

Q. Was there such a pipe in one of those apparatuses? A. Such a pipe was not used.

Q. Was it capped inside?

A. It may have been capped but it was not used. If it was, someone capped it.

Q. Well, at any rate—

The COURT. — (Interrupting.) He has answered that fully. It was not used.

Q. Now, there is illustrated on this drawing Plaintiff's Exhibit No.—what was this number for identification—No. 13 for identification a pipe leading into the chamber at 29 and corresponding in its location and size with the one shown as 29 on that photograph?

A. The photograph does not show as much as is shown there. I cannot say exactly.

Q. Well, all that the photograph does not show is the cap on the inside; is that right?

A. It does not show the connection with the manifold. It does not show where that pipe came from.

Q. Looking at this other photograph—the last one in this series. That does show it connected to the manifold, does it?

(Testimony of Roy C. Hackley.)

A. That does show it connected to the manifold, yes, sir.

Q. Let us not spend much time on this, Mr. Hackley, unless it is necessary. Isn't it true that in that apparatus there was an unused pipe leading down to the pipe in substantially the way shown at 29—

A. (Interrupting.) There was with one of those guns, yes.

Q. Now, won't you look at these photographs also and state whether they show the air pipes leading down on the outside of the chamber—the pipes which subsequently were connected in some way to the bottom of [69] the chamber to jets directed toward the outlet?

A. They show them on the outside and leaving on the bottom.

Q. And that is the way it was arranged on at least one of these machines? A. Yes, sir.

Q. These photographs show also the inclination on which the chamber was set, do they not?

A. That inclination was not intentional.

Q. Well, it is present in this photograph, isn't it?

A. I do not know what the grade is—what the grade of that tunnel was, whether it was a three and a half per cent grade or not. And I do not know which direction that was in.

Q. Well, at any rate, the photograph shows the chambers set on an inclination?

A. It shows the chamber set on an inclination with the track.

Q. And the chambers were so set in some instances on this work, were they not?

(Testimony of Roy C. Hackley.)

A. Not intentionally.

The COURT.—Cross-examine.

Mr. WILLIAMS.—I think now with this further testimony I shall offer in evidence the drawing which was formerly marked for identification as Exhibit 13. I think that is sufficiently established now.

The WITNESS.—That pipe never was in there.

Mr. TOWNSEND.—29 you mean?

The WITNESS.—Yes.

The COURT.—The objection will be sustained. Get a correct drawing made and you can produce it, and do not produce one that may mislead the Court. Cross-examine if you have anything with this witness. Proceed with the cross-examination. [70]

Cross-examination.

(By Mr. TOWNSEND.)

Q. So pipe 29 which you see in this machine was not used if put on in subsequent machines?

A. No, it was not.

Q. Did you ever at any time admit air into your gun anywhere except at the bottom? A. No.

Mr. TOWNSEND.—That is all.

(Witness excused.)

Mr. WILLIAMS.—I will recall Mr. Oxenham again.

The COURT.—What is this witness for?

Mr. WILLIAMS.—I want to ask him particularly about this pipe 27-A, whether he saw that identical

(Testimony of Shirley Houghton.)

one extending up there in that manner. It is a matter of utter insignificance, I grant you that—

The COURT.—Well, we will not hear him now.

Mr. TOWNSEND.—It is incompetent.

The COURT.—Call your next witness if you have one.

Mr. WILLIAMS.—Your Honor, I think I shall offer by the testimony of Mr. Oxenham to show that he observed that particular pipe extending in that way.

The COURT.—Do not recall him now. If you have another witness proceed or you rest. Take your choice. The Court assumes that counsel has prepared his case outside of court on his time and is not preparing it on mine, and if you have any witnesses I want you to present them with some degree of diligence and not wait and wait and wait. [71]

TESTIMONY OF SHIRLEY HOUGHTON, FOR PLAINTIFF.

SHIRLEY HOUGHTON, plaintiff's witness.

My name is Shirley Houghton. I am 44 years old. I live at San Francisco, California, and am a construction engineer. I saw pneumatic concrete placing machines which were used by R. C. Storrie & Company at several different places. The first place I saw such a machine used by the defendant was on the Mile Rock tunnel at San Francisco.

(Testimony of Shirley Houghton.)

Mr. TOWNSEND.—If your Honor please, I object to any testimony in regard to this different work done outside of this district. This is a suit laid on the Skagit River job.

Mr. WILLIAMS.—If the Court please, the patents are as broad as the United States and any act of infringement anywhere, of course the defendant is liable for it.

The COURT.—What infringement have you charged—

Mr. WILLIAMS.—We have charged simply infringement.

Mr. TOWNSEND.—What they are trying to do your Honor, is to prove an estoppel which they have not pleaded and which they tried to plead in paragraph 5 of the bill of complaint and which was struck out. If you will read paragraph 5, that is what they are getting at, and they brought this gentleman from San Francisco and the paragraph 5 was struck out by order of Court on motion of the defendant. So they are not permitted now to offer proof of an alleged estoppel.

The COURT.—Was paragraph 5 stricken from your complaint?

Mr. WILLIAMS.—Yes, your Honor.

The COURT.—You may show the use of the machine, but nothing in respect to the estoppel pleaded.

* * * * * * * * *

A. It was about the year 1914, to the best of my recollection. [72]

(Testimony of Shirley Houghton.)

Q. Now, how did you come to see that machine at that time?

Mr. TOWNSEND.—That is objected to as irrelevant and immaterial.

The COURT.—Sustained. I do not care how he got there.

WITNESS.—It was the so-called McMichael machine. I know it was the McMichael machine because I was the licensee of the Concrete Mixing & Conveying Company for the Western section of the country, and in that capacity we entered into a contract with Storrie & Company for the installation of these machines. The partnership of which I was one of the members installed that first machine which I saw in the Mile Rock tunnel. The name of that partnership was Pacific Concrete Placing Company. I next saw pneumatic concrete placing machines used by the defendant on the Twin Peaks tunnel in San Francisco.

Q. Will you describe the machines in a general way which you there saw?

A. The machines were the McMichael type of mchines with additional air ports added to the side and the heel of the elbow. I investigated as Mr. Storrie had told us that he would put our machines on that job. We later found out that he had built machines of his own manufacture and put them on there. We went out to investigate and see.

Mr. TOWNSEND.—I move that the answer be stricken as not responsive.

(Testimony of Shirley Houghton.)

The COURT.—It will be stricken. [73]

The machines which the Storrie Company used on the Twin Peaks job were not McMichael machines furnished by me as an agent or licensee of the plaintiff. These machines which I saw on the Twin Peaks job were vertical in type, similar in construction to the McMichael machines which were installed on the Mile Rock tunnel, except that they were of larger capacity and were provided with a few additional air ports leading into the shell of the machine. I made complaint or representation to the Storrie Company relative to its use of these machines not furnished by me or by the plaintiff. As a result of this complaint, R. C. Storrie & Company entered into a compromise contract, with us under which they paid us royalty for the use of these machines and agreed to return the machines to us at the completion of the Twin Peaks job.

Cross-examination.

(By Mr. TOWNSEND.)

Q. On the Mile Rock job where you say that a so-called McMichael gun was used, where was the air chamber into that receptacle?

A. It was admitted at several different points. There were air ports on the shell of the vertical—there was a sort of a cone-shaped receiver around the shell as well as into the heel of the exhaust elbow on the bottom of the shell.

Q. Where you had air coming into this McMichael receptacle at the top and on the material

(Testimony of Shirley Houghton.)

and then you also had air coming into the elbow outside of the shell and adjacent to the outlet to impel the concrete through the discharge pipe?

A. It would depend upon the operator just how he might admit the air. He could not admit it around the shell [74] if he so desired and he could admit it at the bottom or he could admit it on the shell or at the bottom simultaneously or in between. Different operators use a little different practice in the exact manner in which they admit the air into the chambers containing the concrete materials.

Q. A so-called chamber jet was outside of the receptacle, wasn't it, where it entered the elbow?

A. The air jet?

Q. Yes.

A. The air port into the heel of the elbow could be termed a jet. It was into the mixer compartment as there was no division between the elbow and the conical chamber of the mixer.

Q. And all the air did not go into the receptacle then but some of it went into the discharge pipe and separate of the shell.

A. It could go up into the receptacle.

Q. I am asking as to the layout of the pipe.

A. You refer to this particular job?

Q. Yes. A. The Twin Peaks job?

Q. I am speaking of the Mile Rock job.

A. The Mile Rock job?

Q. Yes.

(Testimony of Shirley Houghton.)

A. As I said before that would be the way the operator would happen to handle his valves as to where the air would go first.

Q. He might let some in at the top of the receptacle or he might let some in at the heel outside of the receptacle, is that right? [75]

A. He might do it simultaneously or he might do it in behind—using one valve as ahead of the other —or he might use the other one first. It depends on the condition along the pipe-line and what he wished to accomplish.

Mr. TOWNSEND.—That is all.

Mr. WILLIAMS.—That is all.

TESTIMONY OF H. B. KIRKLAND, FOR PLAINTIFF.

H. B. KIRKLAND, plaintiff's witness.

My name is H. B. Kirkland. My age is 46. I reside at Evanston, Illinois. I am chief engineer of Concrete Mixing & Conveying Company. I have occupied this position as chief engineer since 1913. I was trained as an engineer. I have been engaged in the practice of engineering.

Q. Now, what briefly is the business of the plaintiff, the Concrete Mixing and Conveying Company?

A. Manufacturing and leasing and the operation of pneumatic machines for concrete placing.

Q. What kind of pneumatic machines?

A. Concrete machines—pneumatic concrete machines.

(Testimony of H. B. Kirkland.)

Q. Are you familiar with the McMichael patent? Have you read it? A. Yes, sir.

Q. Does the Concrete Mixing and Conveying Company lease machines purporting to embody the invention of the McMichael patent? A. Yes, sir.

WITNESS.—I produce a photograph of the commercial apparatus as leased by the plaintiff.

(The photograph produced by the witness was admitted in evidence as Plaintiff's Exhibit No. 16.) [76]

Q. How long has the plaintiff been making or having made and leasing apparatus such as is shown in this photograph?

A. Since about 1909, I think.

* * * * * * * * *

Q. Well, from your personal knowledge how long? A. Since 1913.

WITNESS.—I produce a cross-section drawing of the pneumatic placing apparatus of the McMichael patent as manufactured and leased by the plaintiff, and I also produce a drawing showing [77] the pipe connections. This is the commercial form of the plaintiff's apparatus.

(The drawings produced by the witness were admitted in evidence as Plaintiff's Exhibit No. 17, Drawings A and B.)

These drawings which I have produced represent the details of the construction of the commercial device as shown in the photograph just produced by me.

(Testimony of H. B. Kirkland.)

A. Yes, sir; I have a book here with several pictures in it showing construction jobs.

Q. Won't you turn over these photographs of this booklet and state rapidly what they show in a general way.

Mr. TOWNSEND.—Your Honor, we object to this unless some foundation is shown that this man or his company took and made these jobs or did the work on them and that he took these photographs. If he simply gathered haphazard here and there photographs on various work, of course it is nothing but hearsay and irrelevant and incompetent.

The COURT.—Prove their competency if you desire. I do not think that they have been proven yet. The objection is good.

Q. These photographs which you say you have here, were they taken by you or at your instance?

A. Some of them were on jobs where I supervised the installation of the machanes.

Q. Did you see the work on all of the jobs which you have photographs of here?

A. Most of them; not all of them.

Q. Do the photographs illustrate what you saw on those jobs, and about those jobs?

A. Yes, sir. [78]

Q. Were those the jobs on which this McMichael pneumatic placing apparatus was used?

A. Yes, sir.

Q. Do the photographs show that apparatus in use?

(Testimony of H. B. Kirkland.)

A. Some of the photographs show the machines in the tunnel.

Q. Now, won't you turn over the photographs in that book and state what is shown by those you have personal knowledge of. That is where you saw the work yourself and either took the photographs or had them taken.

A. Here is a view of the interior of the Diana Tunnel on the Louisville and Nashville Railway, showing the discharge pipes and the forms.

Q. You will have to speak louder. Talk to me. Hold your voice up.

A. Here is a view of the interior of the St. Louis Water Works Tunnel showing the discharge pipe flowing over the top of the forms.

The COURT.—What point will this make clear in the patent itself? No controversy over the fact that this concrete is shot out through this pipe and over the forms, I have no doubt.

Mr. WILLIAMS.—I presume there will not be, but the photographs will show how it is done and the situations in which it is done, which I think is important.

The COURT.—I cannot see how it will help us at a decision at all. The question is whether their machine is your machine; whether your patent is valid and whether they are using machines like yours. Proceed. [79]

Mr. WILLIAMS.—Well, I should like to offer in evidence the book of photographs as Plaintiff's Exhibit 18.

Mr. TOWNSEND.—The offer is objected to on the ground that it is incompetent, irrelevant and immaterial and not bearing on any issues of the case.

The COURT.—Let me see the book.

Mr. TOWNSEND.—The patent is not particularly concerned with the building of tunnels. It has to do with transportation of concrete. These photographs also show interior tunnel construction.

The COURT.—Objection sustained. It is not necessary at all. Proceed with the witness.

(Book of photographs identified as Plaintiff's Exhibit 18 and admission in evidence denied.)

Q. I think I will ask you, Mr. Kirkland, to explain or describe very briefly how a concrete lined tunnel is built. I do not want you to go into any elaborate detail.

Mr. TOWNSEND.—I make the same objection, your Honor, that this is a patent that speaks for itself.

The COURT.—Yes.

Mr. TOWNSEND.—And it mentions the word "tunnel" only once.

The COURT.—Sustained.

Mr. WILLIAMS.—This patent is addressed to persons skilled in the art, and I should like an opportunity to make a record of the condition of the art and the art in which it is to be employed. I understand that the Court sustains the objection. I would like to have the question read.

(Testimony of H. B. Kirkland.)

(Whereupon question was read as follows: [80] "I think I will ask you, Mr. Kirkland, to explain or describe very briefly how a concrete lined tunnel is built. I do not want you to go into any elaborate detail.")

The COURT.—I cannot see how that is necessary. The question is this machine, how it functions and how it is made in relation to the parts; whether the machines of the defendant infringe your patent. But as to how a piece of work is carried on or how tunnels are excavated, I cannot see how that will enlighten us any. If it should appear that it is competent after their case, you will have a chance on rebuttal. Objection sustained.

Mr. WILLIAMS.—I would like to have an exception.

The COURT.—Note it.

The McMichael apparatus has been used mainly in tunnel work for lining the tunnels with concrete.

I first learned about the use of this McMichael apparatus in Cleveland, Ohio. I heard that McMichael was experimenting with a machine on the Dennison Viaduct where he was placing concrete through a 6″ pipe, 80′ in height. I was then engineer for the contractor in charge of the construction of the Rocky River Bridge there. This was in 1909. Since that time I have been familiar with the use of these McMichael apparatuses and their methods. This has been my business with the plaintiff company, since 1913.

(Testimony of H. B. Kirkland.)

In reply to a request by counsel that I name some of the tunnels or other large projects upon which contractors have, under lease or otherwise, used the McMichael apparatus of the plaintiff company in the lining and handling of concrete, I will say that we have lined the St. Louis Water Works Tunnel, [81] a tunnel about 2400 feet long and 8 feet in diameter; the Summit Tunnel of the C. B. & Q. Railroad in Wyoming; a couple of tunnels for the city of Memphis Water Works—rather drainage 16 feet in diameter, under air pressure. The Diana Tunnel of the L. & N. Railroad. Several tunnels on the Southern Pacific. I think there were nineteen tunnels altogether there. The New York Subway work, the Chicago Water Works eight miles long, and the Wilson Avenue tunnel.

I here produce a list of tunnel jobs, being tunnel jobs constructed by the use of the McMichael apparatus, under license or lease from the plaintiff company.

(The list of jobs produced by the witness was admitted in evidence as Plaintiff's Exhibit No. 19.)

Q. Now when you first learned of this McMichael apparatus and method were you in a position where the matter was presented to you for your consideration on behalf of a contracting concern? A. Yes, sir.

Mr. TOWNSEND.—Objected to as irrelevant and immaterial.

Mr. WILLIAMS.—This is merely preliminary.

(Testimony of H. B. Kirkland.)

The COURT.—Overruled. Proceed to what is material.

WITNESS.—At that time I was engineer for the contractor of the Rocky River Bridge built in Cleveland, Ohio and we thought of using it for placing concrete in the arches of that bridge. The arches were the longest in the world.

Q. And with what conclusion? Did you confer with their people about it?

A. Yes, I conferred with the contractor.

Q. You speak so softly. I barely can hear you.

A. Yes. We conferred with the concern in the contracting [82] business.

Q. And what was that contracting company—what was its name?

A. I have forgotten that.

The COURT.—Well, if he has forgotten, pass on. [83]

Q. What was your conclusion after having the McMichael matter proposed to you for use in that work?

Mr. TOWNSEND.—We object, your Honor, on the ground that this is not proper.

The COURT.—What is the object of this?

Mr. WILLIAMS.—I want to show that engineers, when this plan of operation was first proposed regarded it as an impossible matter of achievement, and to show what the state of feeling in the art was relative to the thing proposed.

Mr. TOWNSEND.—That adds nothing to what the patent shows itself. They must stand on the

(Testimony of H. B. Kirkland.)

patent and not on whether or not we are to come within it.

Mr. WILLIAMS.—Of course we must stand upon the patent, but I believe we are entitled to show what the condition of the engineers—what the feeling of the engineers, what the belief of the engineers in regard to this art was at the time that this proposal was first made.

The COURT.—I cannot see that it is material. You can show what the art was and how far it has expanded it, if you desire. Objection will be sustained.

Q. To what extent does the pneumatic placing of concrete by the means and method of the McMichael patent gun come into use in connection with the lining of tunnels?

A. Practically every tunnel of importance in the country to-day uses the pneumatic method of lining.

Q. Is this method an apparatus of special value in tunnel work as compared with other concrete work such as paving or building operations? [84]

A. I should say that the use of pneumatic methods, in comparison to old methods, save—one costs one-third or one-half of what the old method cost.

Q. In connection with what class of work?

A. Tunnel lining. That is, in ordinary tunnels. Of course, tunnels that are build under air pressure, in that case they save a great deal more.

Q. Is there any reason why this McMichael

(Testimony of H. B. Kirkland.)

method and apparatus is of such special utility or value in tunnel work as compared wih other concrete work. For example, in foundation walls or building floors.

A. I don't think that I understand you.

Q. Well, you have said that this apparatus and this method was used to the exclusion of everything else in tunnel lining, haven't you?

A. Yes, sir.

Q. It is not so used to the exclusion of everything else in making concrete buildings?

A. No, sir.

Q. Why is it that it is used exclusively and to the exclusion of everything else in tunnel work?

A. Because of the cost of air.

Mr. TOWNSEND.—I object to that statement by counsel. In the first place it is not the testimony of the witness, and in the second place it is not proven, and they cannot prove it.

The COURT.—Cannot prove what?

Mr. TOWNSEND.—Cannot prove that this pneumatic placing of concrete is exclusively used in tunnel work.

The COURT.—He has not said so. That shows for itself. The difficulties of placing it are more in tunnel work than outdoors, of course. He may answer. [85]

A. The cost of making air is a big factor in the placing of concrete pneumatically, and would prohibit its use in ordinary outside work where there is not much—

(Testimony of H. B. Kirkland.)

Q. (Interrupting.) Did you hear the answer that Judge Bourquin just gave?

The COURT.—Do not let him approve my statements in advance. Those things are obvious. I do not always need to be told that two and two make four. I might, sometimes.

Practically every tunnel of importance in the country is now lined by the pneumatic method of placing concrete. I have made it my business since 1913 to learn about these tunnel jobs as they came along and to try to get the contract for the use of this apparatus. This has been my main business since 1913.

Q. Now, did you in that way or in the course of your work as chief engineer of the plaintiff company here learn of the project of the City of Seattle to build this Skagit River Tunnel?

A. Yes, sir.

Q. Now, when did you learn of that? If you have correspondence or anything to aid your recollection get it out and refresh your recollection and then state the facts.

A. I have some correspondence here, dated in January of 1921 with Mr. Uhden, Chief Engineer of the Skagit River Power Company. I called on Mr. Uhden about that time out here in Seattle.

Q. You say that he was the engineer of the Power Company; is that what you said?

A. Chief engineer of the project for the city of Seattle, I mean. [86]

(Testimony of H. B. Kirkland.)

Q. And what representations did you make to him and he to you, briefly?

A. Well, I told him about the pneumatic method and of its advantages for tunnel work such as sealing the rock tightly and making unnecessary a good deal of grouting that is ordinarily done, and show him pictures of the use of the machine, and urged him to use it on the Skagit Tunnel.

Q. How did you first learn of the Skagit River project? By a communication of Mr. Uhden to you or in some other way?

A. He wrote us asking for information. He sent us a copy of the cross-section of the tunnel.

Q. Do you have the correspondence here which passed between him and you or your company?

A. Yes, sir.

Q. That was in about 1921? A. Yes, sir.

Q. Now, do you know whether the correspondence and your personal visit and representations to Mr. Uhden led to the specification of the use of the pneumatic method of the McMichael patent or any pneumatic method in the lining of this Skagit River Tunnel? A. Yes, sir.

Mr. TOWNSEND.—I object to this as incompetent, irrelevant and immaterial.

The COURT.—What is the object of this?

Mr. WILLIAMS.—I want to show that it was at the instance of this plaintiff that the city and the engineers became interested in this pneumatic placement and the answer to that will show that they specified [87] that it should be used on the

(Testimony of H. B. Kirkland.)

job and then the contracts were let to R. C. Storrie & Company, and they used a method which we say is the infringing method.

The COURT.—That is the only question, whether it was an infringing method or not. That is the only question, and how they came to use it is immaterial. Objection sustained.

Mr. WILLIAMS.—Exception. I should like to have noted.

Q. What, approximately, is the weight of a cubic yard of concrete? A. About two tons

Q. Are you familiar with the use of this McMichael apparatus and method in the lining of the Twin Peaks Tunnel at San Francisco?

A. I know of it.

Mr. TOWNSEND.—I object to that as immaterial. It has been gone into by the previous witness. There is no charge that that is an infringement.

The COURT.—How is that?

Mr. TOWNSEND.—There is no charge that the Twin Peak work is an infringement.

Mr. WILLIAMS—Well, I grant you that that particular question was an immaterial one I will ask another, if I may.

Q. How far has concrete to your knowledge been conveyed through the duct or conduit of the McMichael *apparature* commercially and as feasibly practiced?

A. 4,900 feet, I understand in the Twin Peaks Tunnel in San Francisco.

(Testimony of H. B. Kirkland.)

Q. What is the highest elevation to which concrete has been carried by the use of this mechanical apparatus and method, as far as you know?

A. 105 cubic feet is the highest that we have had— [88]

Q. (Interrupting) 105 cubic feet?

A. 105 feet, rather, is the highest that we have had any occasion to shoot it.

Q. In the use of this McMichael apparatus—let me ask you first, have you operated this apparatus yourself? A. Yes, sir.

Q. And have you taught other people how to do it? A. Yes, sir.

Q. And you know how it operates?

A. Yes, sir.

Q. Let me ask you whether or not the proper mixture of the ingredients of the concrete as made in the chamber of this apparatus is fully preserved through its passage and discharge into the form where it is to be set? A. Yes, sir.

Q. Is there any separation of the cement or the sand from the rock in an objectionable manner or degree? A. No, sir.

Q. How long does it take to discharge a batch of concrete materials from the chamber of this McMichael apparatus?

A. It is just a matter of seconds. [89]

Q. How rapidly does it propel it through the conduit?

A. I think about five seconds per hundred lineal feet of pipe.

(Testimony of H. B. Kirkland.)

Q. When the concrete is conveyed through the duct or conduit of the McMichael apparatus and reaches the form or the key of a tunnel arch in which the concrete is to be set, what is the effect of the discharge of that concrete upon the concrete itself—the quality and characteristics of the concrete?

A. The concrete, weighing perhaps a ton is discharged from the end of the pipe into a tunnel form where concrete has been previously put, and discharges into the previously placed concrete with such force, going perhaps 60 miles an hour that it gives it a tremendous shock so that the whole mass will quake and it makes a very dense mixture and packs it in solidly.

Q. How does concrete thus formed by the use of this method and apparatus compare in quality with concrete formed by hand manipulation—put in place by hand and tamped by hand?

A. Concrete tamped by hand is very likely to be porous whereas pneumatic concrete is very dense and fills up the spaces against the rock much more tightly than could possibly be done by hand; also in tunnels where there is timber used, it is necessary to pack in the concrete in all the vacant spaces which is impossible by hand and always shows up with the pneumatic method.

Q. How far into a form can concrete be placed or thrown by hand processes and tamped?

A. Just as far as a man can reach with a stick or shovel to tamp it with. [90]

(Testimony of H. B. Kirkland.)

Q. How far is that?

A. A few feet—three or four feet.

Q. How far can—is concrete carried from the end of the discharge duct of the McMichael apparatus to the place in the form at which it is to set?

A. About 20 feet. The end of the pipe is usually carried to within 20 feet of the rear of the forms.

Q. Is the pipe carried over the form and between the form and the rough interior of the excavated tunnel? A. Yes, sir.

Q. How far can concrete be conveyed partly through the duct and partly after it reaches the end of the duct beyond the immediate end of the form?

A. Well, the form can be any convenient length —it may be 40 and it may be 60 feet, and the pipe that discharges the concrete is carried over the top of it to within 20 feet of the back end.

Q. What has been the custom in the commercial use of this apparatus in so far as you know as to the length of form through or by which the concrete has been carried or conveyed to the point at which it is to set?

A. We have had forms 20, 40 and even 80 feet. Where the forms are short, we have them placed in several places.

Q. How far can forms project beyond the point at which the concrete is delivered if hand methods were employed? What would be the maximum?

(Testimony of H. B. Kirkland.)

A. I should say six feet.

Q. What air pressure—what degree of air pressure is commercially used in the operation of this McMichael apparatus and method?

A. From 80 to 120 pounds. [91]

Q. What is the capacity per hour—that is how many yards per hour of concrete can be handled and delivered from one of these McMichael machines in accordance with your experience with them.

A. Well, 60—about 60 yards.—That would be about 240,000 pounds.

Q. What is the diameter of the duct of conduit of this McMichael apparatus as ordinarily used in practice? A. I didn't get that.

Mr. WILLIAMS.—Read the question, please.

(Question read as follows: "Q. What is the diameter of the duct or conduit of this McMichael apparatus as ordinarily used in practice?")

A. Six or eight inches.

Q. Can you produce a sample of concrete such as is produced or that has been produced by the use of this mechanical apparatus? A. Yes, sir.

Q. Is that broken to show the texture—

A. (Interrupting.) Yes.

Q. (Interrupting.) —Of the finished concrete?

A. Yes, sir.

Q. Is that here? A. Yes, sir.

Mr. WILLIAMS.—We offer in evidence and ask that it be marked Plaintiff's Exhibit 20. Is that here somewhere? Is this what you offer?

(Testimony of H. B. Kirkland.)

A. Yes. That is New York Subway concrete.

(Whereupon piece of concrete was admitted in evidence as Plaintiff's Exhibit 20.) [92]

Q. Perhaps you had better state how you characterize the quality of the concrete exhibited by this sample.

A. That is a homogeneous mixture and is characteristic of good concrete. It is dense—that is about all dense,

Q. Impervious to moisture, is it—water flowing through it.

A. Well, not entirely. It will become damp, but it is not porous like some concrete placed by hand.

Q. Have the apparatus or the machines manufactured and leased by the plaintiff company been stamped or marked with the word "Patentee" and the date of the McMichael patent that is, February 9th, 1925? A. Yes sir.

Mr. TOWNSEND.—If they have a mark, your Honor, we would like to see it. If it is a plate, they should produce the plate.

The COURT.—Oh, I do not know. At any rate there is nothing before the Court. Proceed.

Q. Is John H. McMichael, the patentee, living?

A. Mr. McMichael died about 1919.

Q. Now, when was it that concrete came into common use—how long ago?

A. Well, I should say that the lining of tunnels with concrete came in with the making of sidewalls by concrete. Perhaps before 1900.

Q. Well, how long before?

(Testimony of H. B. Kirkland.)

A. As far back as 1880.

Q. Now, have you here in Seattle an example of the McMichael machine as manufactured and leased by the plaintiff and which is available to be exhibited to court and counsel? [93]

A. Yes, sir. It is the Starr Machinery Company in Seattle. There we have a couple of machines.

Mr. WILLIAMS.—That I hesitate to offer in evidence, your Honor. It is a mile and a half from here. It is a heavy piece of apparatus. I invite the Court and counsel to observe that this noon recess or at the conclusion of court or at any time that suits the convenience of the Court.

The COURT.—Well, not now. If the Court ever thinks that he wants to see it, it can be shown later.

Q. Let me see. You referred to the correspondence you had with Mr. Uhden, and produced that. I think I have neglected to offer it in evidence. I do offer it now, as Plaintiff's Exhibit No. 21.

Mr. TOWNSEND.—The correspondence, I understand, was rejected.

Mr. WILLIAMS.—I beg your pardon?

Mr. TOWNSEND.—You are referring to the correspondence?

Mr. WILLIAMS.—Yes.

Mr. TOWNSEND.—That was rejected on objection.

The COURT.—It has not been offered before, I do not believe.

Mr. TOWNSEND.—I object to it on the ground that it is—

The COURT.—(Interrupting.) Sustained.

Mr. WILLIAMS.—Exception I would like, your Honor.

The COURT.—Anything further with this witness? If not, you may cross-examine.

Mr. WILLIAMS.—I have another question, I think.

The COURT.—Bring it forward, counsel. [94]

Mr. WILLIAMS.—I would like to have marked for identification merely these letters which we have offered to put in evidence and as to which the Court has sustained the objection of counsel. I understand that they do not go in evidence. I would like, however, to have them marked for identification.

The COURT.—That can be done.

Mr. WILLIAMS.—As exhibit 21 that would be. And that I should like to have done also with the photographs in the book, or the book of photographs. That would be marked for identification Plaintiff's Exhibit 18.

The COURT.—That may be done.

(Whereupon correspondence between the plaintiff company and Mr. Uhden was marked for identification Plaintiff's Exhibit 21 and denied in evidence and book of photographs was marked Plain-

(Testimony of H. B. Kirkland.)

tiff's Exhibit 18 for identification and denied in evidence.)

Mr. WILLIAMS.—That is all now.

Cross-examination.

(By Mr. TOWNSEND.)

Q. Mr. Kirkland, who prepared this list marked Plaintiff's Exhibit 19 of alleged jobs on which your apparatus was used? A. I did.

Q. Did you notice that there were a great many duplications on there?

A. I went through our files to get the names of jobs that we had done and I did probably get some duplications.

Q. I call your attention and the attention of the Court [95] to the fact that all these that are marked with a pencil check appear in duplicate. In other words, the same job is mentioned twice?

A. Yes, sir.

Q. Did you have any object in duplicating it—making the list appearing longer?

A. I didn't know that it had been duplicated.

Q. Now, do you recall any objections that the alleged users made to the use of concrete placed by the so-called McMichael method and difficulties that these users were caused? A. Yes, sir.

Q. Yes.

A. Everybody has troubles occasionally at the beginning—learning to use the pneumatic method.

Q. So this list does not represent a contented

(Testimony of H. B. Kirkland.)

lot of users or one of those from whom no objection was received?

A. After they had become acquainted with the use of the machine they had no objections.

Q. Do you recall the use in the Pennsylvania Tunnel and their experience with it?

A. No, sir.

Q. That within the last year or two or so—comparatively recently they had to expend a hundred thousand dollars in going over the work that was supposed to be done by the so-called McMichael method or gun?

A. I do not know about any such thing.

Q. You haven't heard of that? A. No, sir.

Q. Have you heard of any trouble from the Southern Pacific? [96]

A. No, sir. They are using it now.

Q. What is the character of gun that they are using? What style?

A. They are using the vertical type.

Q. Do you know that of your own knowledge or just from reports that are coming to you?

A. From reports that I have received.

Q. Merely hearsay?

(Witness does not answer.)

Q. You said that the passing of concrete or material through the pipe was approximately 100 feet every five seconds? A. Yes, sir, approximately.

Q. What measurements have you made to determine velocities in any instance?

(Testimony of H. B. Kirkland.)

A. That estimate is by observation although we have since made measurements that will accurately determine the velocity.

Q. What was the observation you referred to, visual or what? A. Visual.

Q. At what point?

A. At various points along the delivery path.

Q. How would you observe the operation inside of an iron pipe that was opaque?

A. By listening to the slugs going through.

Q. You base it then partly upon your sense of hearing? A. Yes, sir.

Q. It was largely a matter of guess as to how fast it was going, wasn't it? [97]

A. Well, you can guess it pretty approximately.

Q. You said that one of the desirable features of the use of the so-called McMichael gun in placing concrete in tunnels and against forms was the velocity or the violence of the discharge?

A. Yes, sir.

Q. Do I understand you correctly?

A. Yes, sir.

Q. And that that violent discharge gave a compacted product at the deposit point? A. Yes, sir.

Q. Now, if you were to discharge some other material at equal velocity or of equal density by compressed air would you get that same compactness? A. If it was of equal density.

Q. Of equal velocity—of equal density and with equal velocity?

(Testimony of H. B. Kirkland.)

A. And the material had the same velocity, certainly.

Q. So that blowing any material through a pipe where the velocity was the same—strike that out. What proportions of sand, cement and rock or gravel and water do you recommend for use in your machine?

A. Well, any proportion that aggregates cement, rock and water will be carried through the machine and discharged through it.

Q. Any proportion of the rock, do you mean or any of the ingredients?

A. Any proportions of the ingredients.

Q. Any proportion of the given ingredients?

A. Yes, except the discharge of rock alone. That would [98] not be successful.

Q. Rock alone would not be concrete? A. No.

Q. But it would go through your apparatus, would it?

A. Rock alone might cause trouble in getting through.

Q. Well, assume that we have water with it. I did not intend to blow dry rock.

A. Even with water it might cause trouble.

Q. Sand and water would blow through your apparatus, too, would it not?

Mr. WILLIAMS.—I object, your Honor, to these questions which are not germane to the direct and they are rather speculative. They are not germane and not material to what would happen.

(Testimony of H. B. Kirkland.)

Mr. TOWNSEND.—It is a matter of proportion. Here is the plaintiff's own engineer. We would like to know what his machine would handle and what material it is adapted for.

Mr. WILLIAMS.—The question is whether it would do these things and not whether it does.

The COURT.—He has been telling us with what speed it moves. I think you can ask him what proportions it will handle. Read the question.

(Whereupon question was read as follows: "Q. Sand and water would blow through your apparatus too, would it not?")

A. Yes.

Q. Sand and cement too would blow through, mixed with water, would it not?

Mr. WILLIAMS.—I make the same objection. [99]

The COURT.—Objection overruled.

A. Yes, sir.

Q. And cement and water in mobile proportion would also blow through the machine, would it not?

Mr. WILLIAMS.—Same objection.

The COURT.—He may answer. I think those are all obvious.

A. Yes, sir.

Q. Taking the mixture which you call concrete and which you say can be mixed in any proportion with respect to any ingredient—what effect has cement upon the mixture. Does it retard the flow or facilitate its flow?

(Testimony of H. B. Kirkland.)

A. It does not flow through the pipe. It is forced through by pressure.

Q. I beg your pardon?

A. It does not flow through the pipe. It is forced through by pressure.

Q. Well, blown through, isn't it?

A. Well, not like a stream. It is forced through by the expansion of the air.

Q. I am speaking about its traveling through.

A. Yes, sir.

Q. In that sense I used the word "flow" like blowing or traversing, or whatever it is. Does the cement facilitate its movement or retard its movement?

A. I do not think that I would want to say that it would retard it. I am not sure that it does. I guess it might.

Q. Well, isn't it a fact that a certain amount of cement [100] is a lubricant to the movement of the mixture through the pipe?

A. Well, putting lime into it makes it more of a lubricant.

Q. Then that would make it more so?

A. Yes, sir.

Q. The addition of lime? A. Yes, sir.

Q. Speaking, however, of cement that is added to the rock and sand and water—cement has a lubricating effect of some degree, has it not?

A. I should say so.

Q. Will you be good enough, by reference to

(Testimony of H. B. Kirkland.)

Plaintiff's Exhibit 17–B, show to the Court where the air comes into the receptacle?

A. In this machine there are four air ports at the top and one at the bottom at the heel of the discharge elbow.

Q. Will you be good enough to mark with the Court's permission the air port at the top with the letter "A" and a lead arrow?

A. (Witness marks same.) That is "A" and here is the—looking down at the machine shows "A" here, and "A" here, and "A" here, and "A" here (indicating). All machines are connected up in that way.

Q. Now, will you be good enough to indicate the lower air line by the letter "B"?

A. This is it (indicates and marks).

Q. Now, the pipe that I am pointing to, mark that "C," and tell us what that is.

A. That pipe line is the air supply line for the lower [101] inlet.

Q. Is that what you might call a siphon jet, or an injected jet through "C" to point "D"?

A. It is a pressure jet.

Q. And that blows directly into the outlet pipe?

A. Yes, sir.

Q. Will you mark the outlet pipe by the letter "D"?

(Witness marks same.)

Q. Now, in this photograph of the so-called commercial machine, Exhibit 16, will you indicate by lead arrows where the pipe "C–B" enters?

(Testimony of H. B. Kirkland.)

A. That is "B."

Q. Mark that "B" please and mark that "C."

(Witness marks same.)

Q. Now, in the McMichael patent where is the pipe that corresponds to "C–B"—I am showing you an enlargement of the McMichael drawing.

Mr. WILLIAMS.—I object, if the Court please, to this question on the ground that it is not germane. The witness has not testified to the details of the patent. We have a witness whom we expect to call, Mr. Ray, who is competent in a way that I am sure that Mr. Kirkland is not, to answer such question.

The COURT.—I suppose the patent shows all these things for itself and I do not know where it would better the case any to have the witness point out where the pipe is on the patent.

Mr. TOWNSEND.—I do not want to encroach upon your prerogative.

The COURT.—It is not that, but you are simply taking [102] up time uselessly.

Mr. TOWNSEND.—I just want to ask in regard to two features.

The COURT.—You introduced the drawings. You are supposed to indicate something to the Court, and I suppose the other side is entitled to cross-examination, to a limited extent. Be brief, however. Objection will be overruled. Proceed.

A. This pipe, this is the pipe that carries to the interior of the machine at the bottom.

Q. That is marked "ten" with a continuation

(Testimony of H. B. Kirkland.)

down through the body of the concrete, is that correct? A. Yes, sir. Exhibit 10 is the pipe.

Q. Yes. A. Yes.

Mr. WILLIAMS.—It shows for itself.

The COURT.—Yes, undoubtedly.

Mr. LOFTUS.—He has been testifying about this McMichael apparatus and what it will do, and it is competent to show what that apparatus was and how it compared with the McMichael drawings.

The COURT.—It shows for itself and the drawings show for themselves. Proceed, Counsel.

Q. In your so-called commercial machine as shown either in Exhibit 16 or 17–A or 17–B here you have this—you have this "24" that appears in the McMichael patent.

A. We occasionally use that when a machine is sunk in a pit.

Q. That is not my question. Does that appear in these drawings, 17–B or 17–A or in the photograph 16? [103] A. That is the discharge pipe.

Q. You have no traps, 24, or "U" bend shown in either of these so-called McMichael structures?

The COURT.—Well, he said so, and they show for themselves.

Q. Now, here is an enlargement. Does this correctly represent that so-called McMichael machine?

A. Yes, sir.

Q. Which is the structure you use to-day.

A. Both of them are used to-day.

Q. The Ransome Concrete Machinery Company, is that your licensee? A. Yes, sir.

(Testimony of H. B. Kirkland.)

Q. And both of these machines according to your understanding, come within the McMichael patent?

A. Yes, sir.

Mr. TOWNSEND.—I offer this enlargement as Defendant's Exhibit "A" for Identification.

The COURT.—We will have one series of exhibit numbers. What is the next number?

Mr. TOWNSEND.—May I give it the number that will follow my deposition exhibits and call it 133?

The COURT.—Yes, you may.

(Whereupon enlargements of McMichael machine admitted in evidence as Defendant's Exhibit 133.)

Redirect Examination.

When in the use of a vertical McMichael machine which is quite high, it is difficult to raise the concrete up to the top of it and dump it into the machine, we dig a pit and sink the machine down into so that the top of the machine will come at a convenient height for dumping the materials into it. In that case have to have the "U" bend to carry the discharge [104] out of the pit and on through to its destination. The "U" bend is still used under these circumstances.

(Whereupon an adjournment was taken at 12:00 o'clock to 2:00 o'clock of the same day.)

September 13, 1927, 2:00 P. M.

Court convened pursuant to adjournment.

All parties present.

TESTIMONY OF ARTHUR P. ROBINSON, FOR PLAINTIFF.

ARTHUR P. ROBINSON, plaintiff's witness.

My name is Arthur P. Robinson. I am 40 years old. I reside at Plainfield, New Jersey, and I am sales manager of the Ransome Concrete Machinery Company.

I heard the examination this morning of one of the witnesses, during which examination reference was made on cross-examination to the pneumatic concrete placing machines manufactured by the Ransome Company under the license of the Concrete Mixing & Conveying Company. The company with which I am connected is that Ransome Company.

I produce an illustration of the commercial machine put out by the Ransome Concrete Machinery Company under its license. This illustration is a photograph. It shows a small 7′ machine.

Mr. WILLIAMS.—That we offer in evidence and ask that it be marked Plaintiff's Exhibit 22.

Mr. TOWNSEND.—I object to that as incompetent, irrelevant and immaterial.

The COURT.—What is the object of that? Have you got that in already, Counsel?

Mr. WILLIAMS.—It is a somewhat different machine. This is a horizontal form of the machine. What we have put in thus far is the vertical type. [105]

(Testimony of Arthur P. Robinson.)

(The photograph showing the small 7′ horizontal machine was admitted in evidence as Plaintiff's Exhibit No. 22.)

I also submit a blue-print of the same 7′ horizontal machine.

(The blue-print of the 7′ horizontal machine was admitted in evidence as Plaintiff's Exhibit No. 23.)

I produce a photograph of the larger machine and also a drawing of the larger machine. [106]

(The photograph of the larger McMichael type machine of the Ransome Company was admitted in evidence as Plaintiff's Exhibit No. 24, and the blue-print of the same machine was admitted in evidence as Plaintiff's Exhibit No. 25.)

Q. Mr. Robinson, now in what way does the Ransome Company put out these machines?

A. We lease them.

Q. To whom? A. To contractors.

Q. For what kind of work?

A. Mainly for lining of tunnels and subways.

Q. Can you name some of the tunnel jobs on which you have used or on which you have leased these machines under this license?

A. Sebago Lake, Maine, water tunnel; Boston Revere Beach Railroad, Boston; East Boston Railroad tunnel; special work on various New York subway jobs; four now working on Philadelphia store tunnels; three working on the Illinois Central tunnel Ozark Mountains in Illinois; four working on the power development at Calderwood, Tenn. I believe we have now working under lease

(Testimony of Arthur P. Robinson.)

that have not been returned in the United States twenty-seven.

Q. Do you have a complete list of those jobs here?

A. Yes, sir, I have.

Q. That you can submit? A. Yes, sir.

Q. Will you produce it, and we offer that in evidence and ask that it be admitted in evidence as Plaintiff's Exhibit 26.

(The list of jobs on which the McMichael type machine of the Ransome Company was used was admitted in evidence as Plaintiff's Exhibit No. 26.) [107]

I have been connected with the Ransome Company directly since 1915 and indirectly since 1909. I am familiar with the manufacturers of concrete mixing and handling machinery, and know who they are.

Q. Who are some of these prominent concerns engaged in that business?

A. Kerr & Company, Milwaukee; T. L. Smith & Company, Milwaukee; Chain Belt Company, Milwaukee; The Lakewood Company, Cleveland; Construction Machinery Company, Waterloo, Iowa, and the Yeager Company of Columbus, Ohio.

The COURT.—That is enough.

Q. Have these or other manufacturers of such machinery and regularly engaged in the business of making and selling concrete mixing and handling machinery, sold or leased machines for the pneumatic conveyance of concrete? A. No, sir.

Q. I beg your pardon? A. No, sir.

(Testimony of Arthur P. Robinson.)

Q. Have all of these concerns, in so far as you are aware, respected the McMichael patent in suit?

A. Yes, sir.

Mr. TOWNSEND.—That is objected to as incompetent, irrelevant and immaterial.

The COURT.—Sustained.

Q. Do you have available here a sample of these McMichael machines put out by the Ransome Company?

A. There is one in the warehouse or store of the Star Machinery Company.

Q. Where is that?

A. Seventeen hundred and something First Avenue South here in Seattle. [108]

Mr. WILLIAMS.—We offer to make an inspection of that machine available to Court and counsel during or after the trial. That is all.

The COURT.—Cross-examine.

Cross-examination.

(By Mr. TOWNSEND.)

Q. Are both of these machines which are represented in those photographs, Plaintiff's Exhibit 22 and Plaintiff's Exhibit 24 screw driven?

A. No. They are motor driven.

Q. Do you have a screw in each of those types of machines?

A. Yes, sir. The blue-print shows that distinctly.

Q. The screw is shown there? A. Yes, sir.

Q. Isn't it a fact that you have abandoned the use of the screw? A. No, sir.

(Testimony of Arthur P. Robinson.)

Q. Isn't it a fact that the screw was proved a failure? A. No, sir.

Q. And that you are now using the Hackley construction? A. No, sir.

Q. Isn't it a fact that you are now infringing the Hackley patent?

Mr. WILLIAMS.—I object as calling for a conclusion.

The COURT.—Sustained.

Q. Isn't it a fact that these two machines have proven a failure on at least one job here in the West?

A. It would not say that they have proved a failure. They completed the job of that. They did not use the screw, if that is what you mean. They took the screw out. [109]

Q. They took the screw out? A. Yes, sir.

Q. What did they do?

A. They put an air jet in the back.

Q. They put an air jet in the bottom and blew it longitudinally in the bottom of the cement container?

A. I couldn't tell you where they put the air jets. They put it in the back so that they blow it forward, yes, sir.

Q. Was that the Cascade job?

A. That was the Grant Smith job at Selah.

Q. Do you use the vertical gun now or sell it at the present time?

A. I don't believe that we have any out in opera-

(Testimony of Arthur P. Robinson.)

tion. We have some at the plant and we have put some out, yes, sir.

Q. You have supplanted all your so-called vertical guns with horizontal guns, haven't you, of the type of Exhibit 22 and 24?

A. We are putting out almost entirely the horizontal type of gun, yes, sir.

Q. Referring to Exhibit drawing No. 25 representing the large type of gun? A. Yes, sir.

Q. What is the capacity of that gun?

A. Fourteen cubic feet of mixed concrete.

Q. Now, when the screw was taken out in this gun where were the air jets placed?

A. I don't know. I wasn't on that job.

Mr. TOWNSEND.—That is all. [110]

Redirect Examination.

By Mr. WILLIAMS.—What is the reason, Mr. Robinson, why you are now largely supplying the horizontal type of gun rather than the vertical type?

Mr. TOWNSEND.—Objected to for the reason that it is of no importance.

The COURT.—Well, you brought it out.

Mr. TOWNSEND.—Oh, very well.

The COURT.—I do not think it is, but you brought it out in the first instance. He may answer.

A. What was the question again?

(Question read as follows:)

Q. What is the reason, Mr. Robinson, why you are now largely supplying the horizontal type of gun rather than the vertical type?

(Testimony of Arthur P. Robinson.)

A. Two reasons—three reasons, I would say. First, we get a smaller air consumption than we got with the vertical type of gun; secondly, we practically do away entirely with the tendency of blocking due to the even speed; and third there is a very considerable saving in the overall height. The recent practice is that the machines follow the forms and in small tunnels you cannot get the vertical machine in.

Mr. WILLIAMS.—That is all.

The COURT.—Call your next witness.

Mr. TOWNSEND.—Approximate the date, please, when you went to the horizontal type?

A. I think I have got it on the back of here, but I am not sure. I would say in 1925. [111]

TESTIMONY OF O. R. BROCK, FOR PLAINTIFF.

O. R. BROCK, plaintiff's witness.

My name is O. R. Brock. My age is 47, and I reside in Seattle at 619–12th Avenue. My occupation is mining and concreting in tunnels. In 1923 or thereabouts I was employed by R. C. Storrie Company, the defendant here. I was engaged in concrete work as a foreman. I had charge of the concrete work at nights. I did not operate any concrete placing apparatus that was used in lining the Skagit tunnel, but I had men working for me who did this work. I saw the placing machines that were there used. My duties were to give my

(Testimony of O. R. Brock.)

men orders to go ahead and build the forms and get the concrete in from the outside of the tunnel into the mixers. The operation of the concrete placing machines came under my supervision, and I learned what the construction of those machines was.

Q. Will you describe those machines?

A. Those machines?

Q. Yes.

A. Well, I would describe those machines—which way do you mean—the way they were working or operated?

Q. No. Can you describe how they were made, in a general way? A. How they were made?

Q. Yes.

A. Well, they were made from steel and kind of shaped—I think they were sixteen feet long and a filling on top where we put the concrete in there and we had manifolds with air where we got the concrete out of the gun. We had four walls and an eight-inch pipe where the air put the concrete through the pipe and [112] replaced it behind the forms.

Q. Do you know where the pipes led to?

A. Yes, sir.

Q. This chamber that you speak of?

A. Yes, sir.

Q. And where the conduit left it and so on?

A. Yes, sir.

Q. Will you look—have you looked at this drawing before you took the witness-stand?

(Testimony of O. R. Brock.)

A. I was over here and looked at it. Yes, that is the same thing. (Looking at drawing.) That is the machine we had.

Q. Now, on this drawing there are some marks in red. A. That was left out on the drawing.

Q. Did you put them there?

A. I put them there myself.

Q. Will you state whether or not this drawing with the representation in red at 27-A correctly shows one of the machines which was used on this Skagit tunnel job and which was operated under your direction as foreman for R. C. Storrie & Company?

A. Yes, sir, that is correct. The way it stands there, it is correct.

Q. It is hard to hear you.

A. The way the print is there—the way the print is drawn, that is the way that the machine was in operation—the way that we operated it. All those pipes. The way that she is right now.

Q. Now, do you know whether—

A. (Interrupting.) There was no change made.

Q. Do you know whether in the first of those machines [113] there was a pipe that went into the chamber at 29, as shown on this drawing?

Mr. TOWNSEND.—I object to that as leading, your Honor.

The COURT.—Oh, it is, but then he may answer. Overruled.

A. Yes, sir.

Q. Was that pipe used or was it not used?

(Testimony of O. R. Brock.)

A. It was not used.

Q. These other pipes, as shown on this drawing, and terminating at 25–A and another at 26–A and another at 27–A, as shown in red, does that correspond or does it not correspond with the terminals of the pipe as used in the actual machines?

A. Yes, sir; just exactly.

Mr. WILLIAMS.—We offer now this drawing as identified by this witness and ask that it be marked Plaintiff's Exhibit 13. The drawing to be taken as containing the representation in red at 27–A.

(Whereupon drawing marked previously Plaintiff's Exhibit 13 for identification was admitted in evidence as Plaintiff's Exhibit 13.)

Cross-examination.

(By Mr. TOWNSEND.)

Q. You spoke of putting concrete into the chamber of this machine. Where was that put in?

A. On the Skagit tunnel.

Q. How? A. On the Skagit tunnel. [114]

Q. No, I mean where were the concrete materials put into the chamber of this placing machine?

A. Right in the center of the gun.

Q. The center? A. Yes, sir.

Q. The center of the top shown here on this drawing? A. The center of the top of the gun.

Q. What kind of concrete was it that was put in there? A. It was dry concrete?

Q. Dry concrete? A. Yes, sir.

(Testimony of O. R. Brock.)

Redirect Examination.

Mr. WILLIAMS.—What do you mean by dry concrete?

A. By dry concrete, that means medium concrete; not too wet and not too dry.

Recross-examination.

(By Mr. TOWNSEND.)

Q. What is the consistency in proportion to the material?

A. Well, I cannot tell you. I cannot tell you that. That was the city inspector—it was the city inspector's duty to do that.

Q. It was not your duty to attend to the mixture, there?

A. The inspector would tell me when it was too wet and when it was too dry, and I had to go out to the mixer and mix it.

Q. Isn't it a fact that your connection came after the concrete placing had been finished by Mr. Hackley?

A. What was that question? I cannot hear very good.

Q. Your work came after Mr. Hackley had finished his pneumatic placing? [115]

A. Yes, sir.

Q. And you had nothing to do with the placing. Your connection was only in placing the floors, was it not, on the concrete work?

A. The concrete work.

(Testimony of O. R. Brock.)

Q. And in placing the floors the gun was not used?

A. In placing the floors the gun was not used; no.

Q. Did you ever hear the concrete coming out of the gun at the discharge end? A. I did.

Q. How did it come out?

A. It came out through the eight-inch pipe, through an apron and the concrete—a concrete strip on both sides.

Q. It flowed down gently like over both sides?

A. Yes, sir.

Mr. TOWNSEND.—That is all.

Redirect Examination.

(By Mr. WILLIAMS.)

Q. I don't understand you, Mr. Brock. You seem to have described the concrete coming out of this pneumatic gun. A. Yes, sir.

Q. You saw that, did you? A. Yes, sir.

Q. And were you in and about the work at the time that this gun was in operation?

A. I was in there all night; coming in and out.

Q. Well, was the pneumatic gun shown on this drawing in use on the work while you were there employed? A. Yes, sir. [116]

Mr. WILLIAMS.—That is all.

The COURT.—Just a minute. I do not understand either.

Mr. WILLIAMS.—I did not.

The COURT.—Was your work nothing but laying the floors or in connection with the floors?

(Testimony of O. R. Brock.)

A. I had the laying of the floors and also the arches of the tunnel with the gun—gun work.

The COURT.—You worked both without and with the gun?

A. The tunnels with the gun and the floor without the gun.

Mr. TOWNSEND.—The floor was done last?

A. The floor was done last.

The COURT.—Any further questions?

Mr. WILLIAMS.—I just want to make sure that this witness was on the job and the foreman in charge of the work on which this gun was used while the arch was being poured or shot by the use of this pneumatic gun which he has described. Is that right?

A. Yes, sir.

Mr. TOWNSEND.—What was the date that that was done—when you know that the arch work was being done by the gun?

A. What date we started?

Mr. TOWNSEND.—Yes.

A. When I went to work there was in February, 1924. [117]

TESTIMONY OF FREDERICK RAY, FOR PLAINTIFF.

FREDERICK RAY, plaintiff's witness.

My name is Frederick Ray. I am 48 years old. I live at Shorthills, New Jersey. I have examined the McMichael patent in suit, No. 1,127,600.

(Testimony of Frederick Ray.)

I studied mechanical engineering at Stanford University for a period of between two or three years. Later I spent about three years at Columbia University studying physics and mathematics, and I received the degree of Master of Arts in these subjects. Later I spent a term at Harvard University in the same line of work.

I was occupied as a draftsman, designer and engineer in San Francisco for about three years. Then I was engineer in charge of the centrifugal department of the Henry R. Worthington Company of New York for three and a half years. Then chief engineer of the Alberger Pump and Condenser Company of New York for eight years and a half. Since 1915 I have been practicing as a consulting engineer and during this time I have testified in a considerable number of patent cases involving the description of patents and their operation and similar matters.

I have observed the operation of a number of pneumatic concrete transporting and placing apparatuses embodying the features of construction and operation set forth in the McMichael patent in suit.

Describing the mode of operation of the apparatus shown in the McMichael patent in suit—At 1 in the drawing is indicated a chamber in which is placed a charge of sand, rock, cement and water of the proper proportions. The chamber is then closed by the door at the top, and air pressure is admitted above

(Testimony of Frederick Ray.)

the mass of concrete in the lower portion of the chamber [118] through pipe 8, which is the source of supply, and at the same time air is admitted through pipe 10, which discharges near the bottom of the conical portion of this chamber.

The concrete tends to flow into the discharge pipe, which is marked 23, but due to its composition its flow does not extend very far before it stops. The air from pipe 11 then builds up a pressure around this discharge, cuts across the concrete at that point and blows out that particular slug of concrete which lies below it. As that slug of concrete passes out into the discharge pipe the air pressure is reduced at the discharge of the pipe 10, due to the rapid expansion of the air following the slug, and then there is a further flow from the mass above, building up another plug at the bottom of this pipe, which again is cut and blown off. So that as a result there is a plug of concrete passing in the pipe followed by a certain movement of air and then another plug comes and so on until the whole charge passes out of the chamber into the pipe and and is delivered wherever desired. After that, of course, the air then simply goes out of the pipe and the pressure is reduced and the opening at the top is opened and another charge placed in the chamber.

Mr. TOWNSEND.—I move that the answer be stricken as a misinterpretation of the patent and not a word of justification for the construction that he put upon it of slug action of any sort.

(Testimony of Frederick Ray.)

The COURT.—Well, let it stand. Your motion will be denied. If not competent testimony, why the Court will disregard it. Proceed.

Over objection that no proper foundation was laid, the witness testified.

WITNESS.—Properly mixed concrete forming materials do not have the quality of flowing as do liquids. Due to the composition [119] of such a mixture containing the large amount of irregularly shaped stones which are capable of arching over any given opening or compacting in any given pipe, the ordinary laws pertaining to liquids are no longer obeyed.

I heard the testimony given by the other witnesses called in *prima facie* by the plaintiff, and I have examined the drawing, marked Plaintiff's Exhibit 13, which is illustrative of the apparatus used by *the defendant. I have also read the specifications* and looked at the drawings of the Hackley application for United States letters patent, and I understand them.

There are some slight differences, as to details of construction, between the structure shown in the exhibit drawings of the Hackley application and the structure shown in Plaintiff's Exhibit 13, but these slight differences in details of construction, in my opinion, would not affect the mode of operation of these two devices. The differences are in the arrangement of the air pipes; the way they are brought down to the chamber and the way they are brought into it. Those are the principal differ-

(Testimony of Frederick Ray.)

ences. The air pipes to which I refer are shown at 25–A, 26–A, 27–A and 28 on Plaintiff's Exhibit 13. In the device of the Hackley patent application drawing, the pipes terminate in substantially the same places. The difference between the structure shown in Plaintiff's Exhibit 13 and the structure shown in the Hackley patent application drawing is in the way in which the pipes lead to the terminals.

Q. Now, referring to this Plaintiff's Exhibit No. 13 drawing, and the defendant's apparatus shown. Will you describe or compare the mode of operation which you would expect such apparatus to have with the mode of operation of the apparatus disclosed in the McMichael patent in suit? [120]

Mr. TOWNSEND.—We make the same objection, lack of qualification.

The COURT.—He may answer.

WITNESS.—In my opinion the defendant's apparatus, as shown in Plaintiff's Exhibit 13, operates in identically the same way, as does the apparatus disclosed in the McMichael patent in suit. The structure shown in Exhibit 13 is a horizontal chamber with the discharge leading to one side. When that is filled or pretty well filled with concrete, the discharge opening is closed just the same as in the McMichael patent,—closed by a slug of concrete or by the concrete flowing into the discharge pipe a slight distance. Any air that is admitted at point 27–A or 28–A or 26–A would eventually pass up through the concrete and immediately build pressure on top of the mass of concrete in this chamber,

(Testimony of Frederick Ray.)

and that pressure would tend to force the mass out toward the discharge. The air from the pipe 25–A would cut off the slug which was extending into the pipe and discharge it through the pipe, and in doing so, the pressure at that time [121] would be decreased and more concrete flow in forming another slug, etc., exactly the same as in the McMichael structure. When the concrete is pretty well blown out of this chamber, these jets 28–A, 27–A and 26 would have a tendency, by kinetic action of mere blowing, to blow the concrete somewhat—to move it somewhat toward a discharge opening. That is, a slight movement just like in the bottom of this chamber, the cross-section of which is shown, and it seems to be kind of egg-shaped so that a small, a very small amount of concrete would be sufficient to cover up the passage. In that respect these various nozzles act somewhat like gravity acts in the McMichael structure, that is, in that case the gravity causes the concrete flow all the time down to the discharge, whereas in this case when it is nearly all gone these air jets tend to push over the remaining portions.

Probably, in my opinion, all of the charge might not be discharged from the chamber, but when the next charge is put in, of course, it would be carried out.

Cross-examination.

(By Mr. TOWNSEND.)

Q. What is your occupation. You did not mention it. A. Consulting engineer.

(Testimony of Frederick Ray.)

Q. And what else?

A. That is all I am doing at the present time.

Q. Are you not a professional patent expert?

A. I testify in a great many cases.

Q. What was the last case you testified in?

A. What was the last case?

Q. Yes, the last patent case, and what did it relate to. That is what I mean. [122]

A. The last case I testified in was a case of the Lock Chain Company against the Robbins—against the Link Belt Company of Chicago, and it related to Link belts.

Q. You have been professionally retained, have you, to testify in this case for the plaintiff?

A. Yes, sir.

The COURT.—Oh, yes, or he would not be here.

Q. Referring to the McMichael patent, have you ever seen a machine precisely as shown in this photostat of the McMichael drawing, 1,127,660?

A. Not precisely in all the mechanical details as shown there. I have seen machines that had the equivalent of all of those in my opinion.

Q. In your opinion? A. Yes, sir.

Q. Have you seen one where the air pipe ten, or so-called equivalent, that you speak of, was placed inside of the conical receptacle 1 or 2?

A. No. Those have been placed on the outiside and brought in directly at the point desired.

Q. And in those machines that you saw was there this goose-neck, or trap 24?

(Testimony of Frederick Ray.)

A. I have seen some with it and some without it.

Q. Where it was without the trap in your opinion did the jet of air, ten, assuming its continuity of flow, produced this so-called slug action that you have spoken of?

A. Yes, the action was the same in all cases.

Q. How do you know?

A. By observing the operation—both by seeing it and observing the discharge and by observing pressures [123] occurring at different points.

Q. What was this observation in regard to the flow that you made, and how were these observations made?

A. Well, I have listened to the slugs passing through on many occasions. I have witnessed slugs come out of the discharge. I have made observations of the impact of these slugs. I have observed apparatus or built apparatus which shows the impact of these various slugs. I have taken gauge readings at different points—recorded gauge readings which indicated the passage of these slugs and the pressure passing through them.

Q. Have you a record of any of these gauge readings? A. I have.

Q. Where were these gauge readings placed?

A. They were placed on the chamber and at various points of the pipe-line.

Q. How do you know when you are listening to the material passing through that they are slugs and not something else, or some other form?

(Testimony of Frederick Ray.)

A. Well, I heard them passing through. Of course, from hearing that fact could not be determined exactly, but by hearing it and then observing other similar ones coming out of the discharge pipe I think that the conclusion could not be anything else.

Q. Did you record the frequency of the hearings?

A. I have done so.

Q. What frequency did the so-called slugs pass that you heard?

A. Well, the large slugs, and there are sometimes smaller ones intervening, but usually in the discharge of such a chamber there will be quite a number of good-sized slugs coming along. Those may be a second or [124] two apart—something of that order quite frequently.

Q. How fast was this material traveling through the pipe, do you know, or are you going to guess how fast it was traveling?

A. Well, I have a little more than just mere guessing. I have observed that point roughly, and I have a little other evidence from gauge readings and so on. The slugs move through pretty fast, from 50 to 100 feet a second. I do not think they always go through at the same speed. It depends on the particular slug and it depends on the pressure that you are using and the different other conditions. The length of the pipe will slow that down.

Q. Your estimate is that they went from 50 to 100 feet a second?

(Testimony of Frederick Ray.)

A. Those particular ones that I observed.

Q. And how frequently did you see them?

A. The large slugs in some instances were a second or so apart, but there were other slugs that came very much more frequently.

Q. And with what consistency in your opinion were these slugs separated from an interval of two seconds to five seconds and traveling from 50 to 100 feet a second?

A. I didn't separate them from two to five seconds. I said possibly a second. The consistency—

Q. (Interrupting.) You are just guessing at it because this is inside of iron pipe, aren't you? Now, give us your best guess as to the consistency unless you have some reason to give us some definite relation on the point.

A. I do not quite understand what you mean by the word [125] "consistency." What do you mean by that?

Q. What do you mean by the consistency of a slug. What is the consistency of a slug?

A. A slug is a portion of concrete with air on either side of it. In observing them coming out quite a number of the slugs may come together.

Q. Any air intermingled with the material constituting the so-called slug in your opinion?

A. Not to any great extent in my opinion.

Q. Do you know anything about the losses of friction—losses of moving concrete in a pipe?

A. Yes, sir.

(Testimony of Frederick Ray.)

Q. What do you suppose to be the friction of a slug, the length that you speak of, in a pipe, and particularly where there is an elevation connected with it?

A. Well, the elevation in the first place has not much to do with the friction, but neglecting that point the resistance required to move some slugs took an air pressure of from ten to fifteen pounds on the base of the slug. That will give you an idea of the frictional resistance.

Q. In your opinion a slug of this length could be moved by air pressure by pushing from behind when there was no air commingled with the slug mass? A. Yes, sir.

Q. That is your opinion? A. Yes, sir.

Q. Now what is the function of pipe 8 in the McMichael patent?

A. That particular pipe conducts the air to the top of the chamber above the concrete within it.

Q. What is the function of the pipe 10 in your opinion? [126]

A. The function of the pipe 10 is to cut off slugs at the bottom of the chamber and to push them out through the pipe.

Q. The functions of pipes 8 and 10 are alike, or are they different? A. They are different.

Q. In your opinion the pipe 8 has one function which is not performed by pipe 10, is that true?

A. It is not when the pipe 8 is present. If the pipe 8 is present then the pipe 10 performs both functions.

(Testimony of Frederick Ray.)

Q. But in your opinion the pipe 10 has a function which is not performed by pipe 8? A. Oh, yes.

Q. Is that true?

A. Oh, yes. There is no question about that.

Q. Now, assume that the receptable part of the McMichael machine is filled with water, what would be the action in that case? Would it work in the first place. Would it blow the water out of the pipe?

Mr. WILLIAMS.—I object to that as being wholly immaterial and not a germane question.

The COURT.—I think so. Objection sustained.

Mr. TOWNSEND.—I am leading up. I think it is important because they have constructed a fanciful theory here and we must meet it if we do not want to have any misunderstanding.

Mr. WILLIAMS.—They will have their witnesses. It is not germane.

Mr. TOWNSEND.—I won't take but a moment.

The COURT.—I do not see how there can be much controversy in this case. It appears that you are using the same thing. [127]

Mr. TOWNSEND.—We are blowing concrete.

The COURT.—By this method of air compression which gets the slugs out.

Mr. TOWNSEND.—We do not have any slug action.

The COURT.—He can answer the question. Be brief with it.

A. The water would be blown out, of course.

(Testimony of Frederick Ray.)

Q. If you were blowing water out would you have slugs?

Mr. WILLIAMS.—I make the same objection. I think it it not germane and it is immaterial.

The COURT.—I cannot see myself where this leads to something that is germane. However, I will overrule the objection.

A. Well, you might under some conditions and you would not under other conditions.

Q. If you had sand and water mixed would you have a slug action?

Mr. WILLIAMS.—I make the same objection.

The COURT.—It goes to the witness' qualifications. Overruled.

A. Sand and water mixed of the proper consistency would in some instances give slug action and in other instances it could be flowed out without it.

Q. You mean have a continuous flow?

A. Yes, sir.

Q. Would you say the same if you had a consistency of sand and water which would flow?

A. It would flow like water if it flows like water.

Q. Well, if it would flow through the pipe?

A. Then it would flow like water, which would be a liquid.

Q. If it was blown through the pipe? I am not trying to [128] be technical.

A. It would be like a liquid if blown through.

Q. If cement and water would be acted upon in any desired consistency you desired to specify,

(Testimony of Frederick Ray.)

would you have a slug action with such a mixture, operating the way that you have described?

A. Well, that is possible under certain conditions and under other conditions there would not be such an action. Of course, it seems to me that your question leads to the consideration of cement all the way from perfectly dry cement to what is the equivalent of a perfect liquid.

Q. I am speaking of a cement mixture which could be blown through the pipe.

Mr. WILLIAMS.—Dry or wet.

Q. Oh, no, I am speaking of wet mixtures.

A. You mean that it would flow through the pipe like a liquid?

Q. It would flow through the pipe like a liquid or be that consistency of concerte as you would term it.

A. Well, if it would flow through the pipe like a liquid, under certain conditions it would be possible to get a slug action and under other conditions, depending on the pipe arrangement and other things, it would flow out in a continuous stream. It would be possible to cause it to flow out of such apparatus.

Q. Now, when you have an apparatus—just a minute, I want to get a drawing please. Now, I call your attention to Plaintiff's Exhibit 17–B, alleged to be one of the commercial structures built by it or its licensees. You understand that in this structure the pipe C carries air from a point exterior of the [129] receptacle down to an elbow

(Testimony of Frederick Ray.)

and blows it into the discharge pipe. You understand that construction? A. Yes.

Q. Assuming the air to be on at the time in C, and a suitable pressure, would you have a slug action there? A. What kind of material?

Q. Any kind of material. Choose your own material, sand, water and concrete—sand and water, sand and cement—anything.

A. Well, we put concrete—with the usual concrete mixture there would be a slug action, with water there might be a slug action and there might not, depending on the discharge pipe and various conditions. And that would be true of all intermediate mixtures.

Q. Where you have this siphon jet C, isn't it a fact that that air that is being emitted from C into that elbow and its discharge pipe is commingled with material as it comes down from the receptacle above? Supposing that it is moist and mobile enough and blowing out with it?

A. Not in a concrete mixture. In such a structure as you indicate—when the concrete flows into this discharge pipe at the bottom it will immediately block out that pipe and there will be pressure developed in the air jet which was not there previous to that concrete flowing down and that pressure then causes the slug to pass out. The slug moving on reduces the pressure, which causes a further flow of concrete to that point. That is exactly the way those operate. It does not matter whether you turn

(Testimony of Frederick Ray.)

on the air continuously, or whether you let the concrete in first and turn it on afterwards. They work that way and no other way. [130]

Q. That is your opinion?

A. I know that to be the fact from observation of several such machines.

Q. Based on the same test you have already given, of listening to the so-called slugs passing?

A. Based on my ability of observing the machinery.

Q. And your observation was by hearing—

A. (Interrupting.) By sight and by pressure—by gauges.

Q. Now, when you say that you heard one of these slugs passing in the McMichael machine where did you stand with respect to the machine? What distance from it?

A. Well, many places. You can hear it anywhere along the pipe. I have heard it all places along the pipe.

Q. How far have you been from the machine when you heard what you thought were the so-called slugs passing through it?

A. Possibly one hundred feet; maybe more; maybe nearer.

Q. You do not know what the operator was doing with the valves? A. Oh, yes.

Q. At the time, do you? A. Certainly I do.

Q. How do you know when you were a hundred feet away from him?

(Testimony of Frederick Ray.)

A. I could see him. And then he was carrying out instructions which I had given him in many instances.

Q. Do you know whether or not it is customary for operators when feeding one of the machines to manipulate the valves, or are the valves simply opened and the stuff blown out?

A. As a rule it is only necessary to open the valves and [131] blow them out. Sometimes when sticking occurs they blow it out.

Q. How do you know?

A. I have seen them when that occurred. I know that they do not operate them on an air level—that is, they don't play with them.

Q. Where did you stand when that took place?

A. Stood right by the machine many times when that was done.

Q. You have also stood by the machine when you have seen the manipulation of valves?

A. I have seen him close the valves and build up some pressure and open them up again with the idea, that if there was some sticking taking place,—with the idea of blowing it out. I have seen him blow it out.

Q. When he closed the valves what occurred?

A. When the air valves are closed the pressure in the receiver generally builds up.

Q. And what takes place in the pipe based on your opinion where the material is passing?

A. Well, I don't know just what you mean. Under what condition?

(Testimony of Frederick Ray.)

Q. Is the progress of the material in the pipe retarded, or what? A. When the valve is closed?

Q. When the valve is closed.

A. That again would depend on the conditions,—the amount of the charge and the amount of air in the chamber itself.

The COURT.—That is obvious to the Court.

Mr. TOWNSEND.—I think that is obvious, your Honor.

Q. Have you ever seen a Hackley machine in operation? A. A Hackley? [132]

Q. Yes.

A. Not that I know of by that name.

Q. Well, you testify in regard to a machine that is represented—alleged to be represented by this exhibit—enlargement No. 13. Have you ever seen a machine like that?

A. Not identically the same as that.

Q. You have never seen a machine like 13?

A. Not exactly the same.

Q. What do you mean by not exactly the same? In what respect, if you know, was it different?

A. I have seen horizontal machines with similar outline to that, with the discharge on the end but not with the same arrangement of air jets that are in the chamber as shown on this drawing.

Q. Have you ever seen the defendant's machine?

A. I have not.

Q. And you have never seen one operate, of course, then? A. No.

(Testimony of Frederick Ray.)

Q. Have you ever seen a machine—I am looking for a file-wrapper, Judge.

A. Possibly I have.

Q. (Continuing.) Have you ever seen a machine such as is represented here in the patent of our R. C. Hackley, of March 1st, 1927, patent No. 1,619,297?

A. I have never seen a machine identically the same as shown here.

Q. You heard the previous witnesses state, Mr. Ray, haven't you, that the pipe 29 shown on this exhibit 13 had a cap on it and air was never let into it? A. Yes, sir. [133]

Q. Now, in your opinion, assuming a machine built as shown in this Exhibit 13 and where the pipe 27–A has been corrected, as indicated in red, is it your opinion that this machine would operate the same if it had only this one pipe, say, 26–A, and omitting pipe 25–A and 27–A?

A. No, that is not my opinion.

Q. You feel that one pipe *that* would not operate the same as three?

A. I feel that pipe 25–A could not be omitted and make the thing operate satisfactorily.

Q. Assuming that you have only pipe 25–A in your opinion would the machine operate the same in principle as it does with the pipe 27–A and 26–A?

A. It will operate the same in principle. It will not operate as well in that the charge will not be moved over to the discharge pipe so well. If any means whatsoever are taken to move that charge over by slanting the machine, or by putting a piston

(Testimony of Frederick Ray.)

in or screw, then it will operate perfectly satisfactory with the pipe 25–A alone. Of course, it is essential that the charge come on over into the discharge pipe where it can be acted upon by the air from the pipe 25–A.

Witness excused.

Mr. WILLIAMS.—The plaintiff rests.

(Whereupon the plaintiff rested its case.)

The COURT.—Proceed with the defense.

DEFENDANT'S CASE.

Mr. TOWNSEND.—May it please the Court, a number of [134] depositions have been taken and they have not all yet been returned by the reporters but I have word that they are en route and those that I am not able to offer formally to-day I wish to be considered as offered and that you will bear with me in the delays that have occurred. We have been duly diligent and we have been to tremendous trouble and expense in taking these depositions, after having within three months taken the depositions originally, and where I attended myself and where counsel for the plaintiff was present, and I have had the depositions in the two other cases printed so that if your Honor wants to see them you are welcome to look at them.

The first set of depositions are the depositions taken at Sulphur, Louisiana, of the witnesses Keever and Maxwell. At this time I ask that those be formally received together with the exhibits, and the exhibits be given their number as shown there.

(Deposition of William R. Keever.)

The COURT.—(Interrupting.) The Court will read them afterwards, anyhow. Proceed, Counsel.

(Said depositions of Samuel W. Maxwell and William R. Keever were received in evidence, said depositions reading as follows:)

DEPOSITION OF WILLIAM R. KEEVER, FOR DEFENDANT.

WILLIAM KEEVER, a witness for defendant, whose deposition was taken at Sulphur, Louisiana, on August 30, 1927.

My name is William R. Keever; I am vice-president in charge of operations of the Union Sulphur Company, Sulphur Mines, Louisiana; I have been connected with the Union Sulphur Company since early in 1902, first as contractor drilling wells. From 1905 until the latter part of 1918, I was superintendent of drilling operations, and since that latter time I have been vice-president in charge of operations for the Union Sulphur [135] Company, which company's business has been the producing and marketing of sulphur.

Q. Was the Union Sulphur Company incorporated at the time you came here?

A. I am sure it was.

Q. Please describe the method of mining the sulphur used by the Union Sulphur Company at the time you came here and started to work.

A. In the first place a well was drilled the same as drilling for oil. The casing is set in the top

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of the lime rock for about twenty feet, then drilling is continued through that casing into the sulphur bearing arena a short distance, where another string of pipe is set. Then the drilling is continued inside of that pipe to the bottom of the sulphur deposit which constitutes the drilling operations of the well. The first string of pipe I referred to is 12½ inches; the second string is 10 inches, then an 8-inch perforated pipe is inserted from the bottom of the 10-inch pipe about in the neighborhood of twenty feet; then a combination string of 6-inch and 5-inch pipe is inserted, the 5 inch from the bottom up through the 8 inch to about ten feet above the top of the 8-inch pipe; from this on up to the top of the wall and above for about twenty feet, the 6-inch pipe extends. Inside of this the combination string of 6 and 5 inch a 3-inch pipe is inserted that extends from the bottom of the well to about six feet above the top of the 6-inch pipe. Inside of the 3-inch pipe a one-inch pipe is inserted from within twenty feet of the bottom of the 3-inch pipe. This constitutes what we term, or call, the equipment of [136] a well.

Q. Please explain what these various size pipes were for.

A. The 12½-inch pipe was a surface pipe to protect the hole while drilling and the 10-inch pipe while steaming the well. The 10-inch and the 8-inch pipes conjointly were used as conductors pipes for the hot water. The 6 and 5 inch combination string of pipes is used for hot water conductors to the

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bottom of the well. The 3-inch pipe is the sulphur conducting pipe. The one-inch pipe is used for conducting the air into the well.

Q. What kind of air do you refer to?

A. Compressed air.

Q. You state that comprised the drilling operations? A. Drilling and equipment.

Q. What was the next operation after the drilling and equipment of the well?

A. The next operation was the introduction of hot water through the 10-inch and 8-inch pipes and the 6 and 5 inch pipes. There were two lines leading from the battery of boilers which conveyed the hot water from the plant to the well that connected to the 10-inch pipe and the 6-inch pipe at the top. After the hot water was introduced into the well for a length of time, which varied from twelve to twenty-four hours, the well was then opened up to see if any molten sulphur was in the bottom of the well. If it was found that there was sulphur and the well sealed the air compressor was started at the air plant, and air turned into the well through the one-inch air line which was used to bring the sulphur to the surface. [137]

Q. What did you say brought the sulphur to the surface? A. The compressed air.

Q. These operations you speak of were used in the early years?

A. They were used when I came here in 1902 and have been used continuously since up until the time we shut down. I can say that, with the exception

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of from the middle of 1903 to the first part of 1905, when I was away.

Q. What method was used in these two years?

A. I could not say.

Q. How deep were these sulphur wells?

A. They varied from something like 500 feet to 1400 feet.

Q. At approximately what depth below the surface of the ground was the sulphur found?

A. Well, it was found at a depth of from 500 to 1400 feet.

Q. Was any sulphur produced by the method described from the 1400 feet depth? A. There was.

Q. Please describe what formation was found in the drilling of these wells.

A. Well, from the surface to what we call cap rock, was composed of sand, clay and gravel.

Q. At approximately what depth is the cap rock located in the ground?

A. Well, it varies from something like 400 feet to 1100 or 1200 feet. It depends altogether on what position and locality the well was located on the deposit, or over the deposit.

Q. What was found below the cap, or lime rock?

A. Lime rock and sulphur. [138]

Q. What was found below the lime rock and sulphur? A. Gypsum.

Q. And what was found below the gypsum?

A. Anhydrite.

Q. And what was found below the anhydrite?

A. Rock salt.

(Deposition of William R. Keever.)

Q. And what was found below the rock salt?

A. I do not know. Never drilled through it.

Q. In what form did you find the sulphur?

A. Well, in some stratas it was pure sulphur, but in most of the formations it was lime rock and sulphur mixed. The lime rock is of a porous character, and the sulphur was found in the porosity of the rock. In other words, the rock was honeycombed.

Q. You testified in the case of the same plaintiff, the Concrete Mixing and Conveying Company vs. the Great Western Power Company of California, Suit No. 1804 in Equity, pending in the Northern District of California, and also in case of same plaintiff vs. the Stone & Webster Company, in Equity No. 2747, United States District Court of Massachusetts, I believe, did you not?

A. I think so.

Q. In that case I believe you drew a sketch in your own handwriting of the formations as you found them. I hand you document marked "Sulphur, La., Defendant's Exhibit #1, and ask you if that sketch was drawn by you?

By Mr. WUPPER.—Question objected to as leading.

A. It represents the sulphur deposit as I drew it.

Q. In whose hand is this document marked Exhibit 1 made? [139]

A. In my hand. I made it.

Q. What does it represent?

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By Mr. WUPPER.—Objected to, as the document speaks for itself.

A. It represents the condition of the sulphur mine, and the vertical lines represent the well going from the surface through the lime rock, sulphur bearing rock and gypsum. The sketch above referred to is offered and filed in evidence in the present case, and marked "Defendant's Sulphur Louisiana Exhibit No. 1."

By Mr. WUPPER.—The exhibit is objected to as being secondary, irrelevant, immaterial and not properly proven.

Q. Do you know of any publication that illustrates the formation of the sulphur dome?

A. I have seen illustrations in some publications, but I do not now remember the name of the man who made it.

Q. Mr. Keever, do you know of any suits that have been in court over the method, or process, used by the Union Sulphur Company? A. I do.

Q. Where was this suit, or suits?

A. The suit was the Union Sulphur Company vs. Freeport-Texas Company.

Q. In what court, if you know?

A. I think it was the United States Court.

Q. In what State was the case tried?

A. Most of the evidence was taken in New York, but I think the case was tried before Judge Bradford.

Q. I hand you document marked "Defendant's

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Sulphur, [140] Louisiana Exhibit No. 2," and ask you to state what you know about it?

A. Well, this is a drawing that illustrates the sulphur mine dome.

Q. Were you a witness in the case of Union Sulphur Company vs. Freeport-Texas Company, just referred to?

By Mr. WUPPER.—Objected to as leading.

A. I was.

Q. Defendant offers and files in evidence the document previously referred to, marked "Defendant's Sulphur, Louisiana, Exhibit No. 2."

By Mr. WUPPER.—The exhibit is objected to as incompetent, irrelevant, and not proven as to the original.

Q. Mr. Keever, is this sketch, marked "Defendant's Sulphur, Louisiana, Exhibit No. 2" a reproduction of any other sketch you know of, and have you seen it before, or the original from which it was taken?

A. I think I have seen all the sketches that were made in connection with that suit.

Q. Have you a copy of the testimony and exhibits in the suit of Union Sulphur Company vs. Freeport-Texas Company?

By Mr. WUPPER.—Objected to as leading.

A. I have.

Q. Please examine this and see if you find any sketch or exhibit in that testimony corresponding to the one marked Sulphur, Louisiana, Exhibit No. 2?

A. The sketch you are referring to is the same as

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the Sulphur [141] Exhibit No. 31, on page 235 of Volume 4, of the Union Sulphur Company vs. Freeport-Texas Company.

Q. Which of the sketches is the original of said suit, and where is the original of Sulphur, Exhibit No. 2, if you know?

A. It was in Volume 4 of the Union Sulphur Company vs. Freeport-Texas Company.

Q. Please refer to exhibit marked "Defendant's Sulphur, La., Exhibit No. 1," and explain how you would find the sulphur deposits at different depths.

A. Immediately over the center of the sulphur deposit the sulphur is found at less depth than it is farther out on the periphery of the dome. The deposit is in the shape of an inverted bowl, and as the well was drilled on the outer edge there was more clay and sand to go through before rock was encountered; in other wells the extent of the dome down to the rock was something like 400 or 500 feet; on the outer edge it would be from 1100 to 1200 feet to cap rock.

Q. Have you any diagram, or drawing, that would represent the method, or manner in which the pipes of the Union Sulphur Company were located in the wells?

A. I suppose we have drawings around the office.

Q. I hand you document marked "Sulphur, Louisiana, Exhibit No. 3," and ask you to examine it, and state of what it is a reproduction.

A. It is a reproduction of the equipment of a sulphur well.

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Q. In what manner, if any, does it differ from the equipment described by you this morning as used by the Union Sulphur Company in 1902?

A. It represents the equipment as I described it. [142]

Q. Defendant offers and files in evidence the document above referred to marked "Sulphur, Louisiana, Exhibit No. 3."

By Mr. WUPPER.—The exhibit is objected to as incompetent, being secondary and irrelevant.

Q. Will you please describe the methods used by the Union Sulphur Company when you came here in getting the sulphur to the surface, beginning with the completion of the equipment of the well?

By Mr. KING.—Strike out the question.

Q. What temperature was the water that was introduced into the well that you testified was for the purpose of liquifying the sulphur?

A. It was around 330 degrees, sometimes it being a little less than that, at other times a little higher, it depending on the steam pressure, but was usually carried around 330 degrees.

Q. What was the purpose of introducing the water into the well?

A. The purpose of introducing the hot water was to liquify the sulphur.

Q. To what density or pressure was the compressed air reduced before it was introduced into the well?

A. Well, there was no set pressure to compress the air before it was introduced into the well.

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Q. About what was the amount of the compression?

A. Well, it varied from 350 to 600 pounds approximate pressure.

Q. After the well was first steamed was that all the steaming [143] necessary or was it necessary to continue the steaming?

A. The steaming, or delivering of hot water into the well was a continuous operation, with very few exceptions, during the entire life of the well. There had to be something wrong with the well if the water was taken off it.

Q. What quantities of sulphur were brought to the surface by the Union Sulphur Company during the years you have been connected with them?

A. Well, it varied from year to year, and I would have to go to the records to get the production figures.

Q. Please state the quantities of sulphur brought up the surface of the ground by the Union Sulphur Company by the methods you described with compressed air, since you have been with the Company.

A. I can give this by going to the records. In 1902, 6,727 tons; in 1903, 23,715 tons; 1904, 79,187 tons; 1905, 218,950 tons; 1906, 287,590 tons; 1907, 285,882 tons; in 1908, 367,896 tons; in 1909, 270,725 tons; 1910, 246,510 tons; 1911, 204,220 tons; 1912, 786,605 tons; 1913, 478,565 tons; 1914, 374,470 tons; 1915, 379,885 tons; 1916, 383,065 tons; 1917, 595,130 tons; 1918, 918,700 tons; 1919, 526,250 tons; 1920, 37,635 tons; 1921, 795,980 tons; 1922, 1,146,860 tons.

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By Mr. WUPPER.—The answer is objected to as being read from the record, and not within the peculiar knowledge of the witness, and as being incompetent, irrelevant and immaterial.

Q. Up to what time did the Union Sulphur Company continue [144] to bring sulphur from the ground by compressed air? A. Up to 1924.

Q. From what record did you obtain the information just given about the quantity of the sulphur produced?

A. It was from the Union Sulphur Company's records, taken from their daily production book.

Q. What method was used to bring all this sulphur to the ground?

A. The compressed air method.

Q. What other practical method, aside from the compressed air method has been used by the Union Sulphur Company to bring sulphur to the ground?

A. There was no other practical method.

Q. Do you know of any other practical method used by any other company?

A. I do not; I know that the Freeport-Texas Company are using compressed air in their wells.

By Mr. WUPPER.—Objected to, as being hearsay evidence.

Q. Is it within your knowledge as to the methods used by the Freeport-Texas Company and the Texas Gulf Sulphur Company?

A. I have seen sulphur produced at both companies' plants, and know that they are using compressed air.

(Deposition of William R. Keever.)

Q. Is sulphur easier to convey or lift by compressed air than water, or any other substance you know of, or is it harder?

A. It is harder to convey than water because it is heavier, but if sulphur is kept at the right temperature I can see that it can be no easier or harder than other flowing substances of like density or specific gravity. [145]

Q. When you are pumping sulphur what would be the height of the surrounding column of water, would it be above or below the sulphur?

A. Well, the column of water extended to the top of the six-inch pipe.

Q. Would the liquified sulphur arise above that water, or stay below it before the compressed air forced it out?

A. It would be below before the air was turned in, then the sulphur would come up approximately one-half of the distance from the bottom as the well is deep, because sulphur is about twice the specific gravity as water.

Q. Then you would raise the sulphur by the compressed air to about what height?

A. About one-half of the distance of the depth of the well.

Q. And that would vary in feet about how much?

A. It would vary from 300 to 700 feet. Of course the air is introduced into the sulphur at the bottom of the well, practically within twenty feet of the bottom of the well, which immediately starts to lighten the column of sulphur and starts it up

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and lifts the sulphur more than one-half of the distance on account of it starting from the bottom of the well.

Q. Have you any photographs showing the flow of sulphur at the surface which shows the action of the compressed air?

A. We have had lots of photographs around at different times.

Q. I hand you document marked Exhibit 4, and ask you to identify it?

A. That is the photograph of a producing sulphur well.

Q. Where was that taken?

A. At the Sulphur Mines. [146]

Q. Please indicate by marking on this Sulphur Exhibit No. 4 the sulphur coming through the pipe.

Witness marks Defendant's Sulphur, La., Exhibit Number 4.

Q. How have you marked the place where the sulphur comes from the well?

A. By a cross-mark on the line coming from the discharge pipe of the well.

Q. What is coming from the pipe at the edge of the wall, apparently flowing into a wheelbarrow?

A. Water.

Q. Do you know of what well this is a photograph?

A. I am not sure, but I think it is 33.

Q. Please explain the picture, giving details of various things shown on it.

A. The black looking substance at the end of the three-inch line running down is liquid sulphur

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coming out of there, and is falling into a bin where it congeals; there are four small sulphur bins.

Q. What is the white looking substance in the center of the board wall?

A. Congealed sulphur.

Q. By what method was the sulphur being brought to the ground in this picture, which you say you believe is well No. 33.

A. Compressed air.

Q. When was well No. 33 drilled and steamed?

A. Well, I cannot say, but I think it was in 1902 or 1903.

Q. Could you be positive as to the outside limit?

A. Well, I would not want to say positively without referring to the record; I can do that in about one-half a [147] minute. In 1902.

By Mr. WUPPER.—The answer is objected to as not being of the best evidence.

Q. Was that well steamed and made to produce while you were working for the Union Sulphur Company? A. Yes, sir.

Q. From what record did you obtain that date?

A. From the well log record.

Q. Made by whom?

A. Well, they were made by different workmen in the employ of the company, under the direction of a drilling superintendent.

Q. What was your connection with the company in 1903? A. In 1903 I was contracting.

Q Contracting? A. Drilling wells.

Q For whom?

(Deposition of William R. Keever.)

A. The Union Sulphur Company.

Q. Where?

A. At Sulphur Mines.

Q. Defendant offers and files in evidence Sulphur, La., Exhibit No. 4.

By Mr. WUPPER.—The exhibit is objected to as irrelevant, incompetent, and not proven as to date.

Q. Please state, or describe the manner in which sulphur comes out of the well when produced by compressed air?

A. It comes out intermittently, by gushes, slugs, or pulsations. [148]

Q. About how frequently do these pulsations occur?

A. They vary from seven or eight up to twenty-eight per minute. It depends on the amount of sulphur that the well is producing.

Q. How do you explain the appearance of the sulphur shown coming from the pipe on Sulphur Exhibit No. 4?

A. At the time the photograph was taken the well was making one of its pulsations, or gushes of sulphur.

Q. Was there any difference in the way the sulphur came from the end of the pipe during the various years that the Sulphur Company operated?

A. It always came, so far as I have been able to observe, in the same way, in pulsations.

Q. Were these operations of intermittency made a point of observation on the part of yourself, or

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any of the officers of the company, and if so, in which particular?

A. Well, it has always been quite noticeable. It was early talked about that when a well was pumping you could always tell pretty well what a well was making approximately by the gushes per minute.

Q. What would these variations of pulsations indicate to you as a sulphur man?

A. Where a well was only making a few gushes, from ten to fifteen, it would be pumping a very small quantity of sulphur, but if it pumped up to twenty-eight gushes per minute, it would make from five to six hundred tons in twenty-four hours.

Q. Then, when the well was pumping less sulphur, the gushes would be farther apart rather than the individual gush producing less sulphur? [149]

A. They would be farther apart, and some less sulphur.

Q. About how far was the sulphur conveyed through the pipes by compressed air, after it reached the surface of the ground?

A. It varied in different localities and at different times. I would say probably from forty feet to fifteen hundred feet.

Q. Would it be conveyed up into the air as well as a distance along the ground?

A. It has been lifted, though usually came out of the well to a certain height, and would flow about same level to the bin, but we have raised it vertically and pumped and had it come down again.

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Q. By compressed air?

A. By compressed air.

Q. Was there any difference in the manner that the sulphur came from the end of the pipe when it discharged it into a bin immediately adjoining the well and where it was discharged fifteen hundred feet away?

A. There was no difference perceptible that you could see.

Q. I show you Volume 3 of Plaintiff's Book of Exhibits in the Sulphur-Freeport suit, page 287, and ask you to identify it?

A. It is a representation of a sulphur well discharging sulphur into a bin.

Q. What exhibit was that, and where used?

A. Exhibit No. 43, used in the patent suit of Union Sulphur Company vs. Freeport Texas Company, defendant.

Q. I hand you document marked Sulphur La. Exhibit No. 5, and ask you if that is a replica of the exhibit just [150] testified to by you as being No. 43 in Volume 3 of Plaintiff's Book of Exhibits on page 287, in the suit between the Union Sulphur Company, and the Freeport, Texas, Company?

A. It is a reproduction of Exhibit No. 43.

Q. I will ask you what this document marked Defendant's Sulphur Exhibit No. 5 is, and what it shows?

A. It is a photograph of a sulphur bin, and liquid sulphur coming out of the pipe into the bin.

Q. How do you explain the appearance of the

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sulphur, as it is discharged from the end of the pipe?

A. The photograph was taken during one of the gushes.

Q. What does the black substance represent at the end of the pipe?

A. Coming out of the pipe is liquid sulphur, and the large black substance below is congealed sulphur which we always find around the discharge of the well.

Q. Defendant offers and files in evidence the document marked "Defendant's Sulphur Exhibit No. 5."

By Mr. WUPPER.—The exhibit is objected to as secondary evidence, and not having been proven, there apparently having been no testimony taken as to when the original was made.

Q. From this picture could you say whether it represents the appearance of the discharge pipe of a sulphur well in 1902, or 1906–7?

A. It represents the discharge of sulphur from a well at that time, and at all other times.

Q. I hand you document marked Exhibit No. 6, and ask you to state what it represents. [151]

A. It represents a sulphur well equipped ready for operation, or already in operation.

Q. Please explain the picture, stating the use of the various attachments, pipes, etc.

A. Well, the perpendicular pipe coming out of the ground is the 12½-inch pipe; the small pipe above the 12½-inch is the six-inch pipe; the smaller

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pipe above the six-inch pipe is the three-inch pipe, and coming out of the top of the three-inch pipe is the one-inch pipe. The twelve and one-half inch pipe, marked No. 1, is connected to the ten-inch pipe on the inside of it, but you cannot see it in this diagram, which is used for hot-water conductor to the sulphur deposit. The six-inch pipe, marked No. 2, is used as a hot water conductor to the bottom of the sulphur well in conjunction with the five-inch that is attached to the six-inch. The six and five-inch are used conjointly in the well for water conductors. The three-inch pipe above the six-inch pipe is used as a sulphur conductor from the bottom of the well, marked "sulphur." The first string of pipe above the ground is a six-inch pipe used for conducting hot water to the twelve and one-half inch and ten-inch pipe, marked "water." The second pipe above the ground is a four-inch pipe which connects to the six-inch vertical pipe, which is used for hot water. The top line, or four inch line, leading out vertically, is the sulphur line which conveys the sulphur from the top of the three-inch, or well line, to the sulphur bin. The smaller one-inch pipe leading off horizontally is used for air line, marked "AIR." There is a one-inch line coming out of the end of the four-inch [152] sulphur line which is used as a steam line to keep the sulphur within the four-inch line from congealing, which is marked "Steam line in sulphur Line." The lumber is what is termed as scaffolding up to the top of the well, this being used to lay the different lines on and the workmen have to get out on to the top of the well.

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Q. What does this whole picture, marked "Sulphur Exhibit No. 6" represent?

A. It represents a well equipped with all lines ready for the production of sulphur.

Q. What difference is there between this representation marked "Sulphur Exhibit No. 6" and all other wells equipped for producing the sulphur which is used by the Union Sulphur Company?

A. It is practically the same through the whole life of the operation.

Q. Was there any difference in this equipment, as shown by Exhibit No. 6, and the equipment in use when you came to the Sulphur Mines?

A. It was practically the same equipment.

The hour of twelve o'clock having arrived, the taking of testimony was continued until one-thirty P. M. The hour of one-thirty P. M. having arrived, the testimony was continued.

(By Mr. KING.)

Q. You described this method of liquifying sulphur, and pumping it out of the ground by compressed air, to whom of this method due?

A. To Herman Frasch.

Q. I show you copies of the patents from the testimony in [153] the suit of Union Sulphur Company vs. Freeport & Texas Company, marked "Sulphur Exhibit 7-a" and also one marked "Sulphur Exhibit 7-b," "Sulphur Exhibit 7-a" being patent No. 461,429, and the one marked "Sulphur Exhibit 7-b" being No. 461,430, and ask you if

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the patentee in those patents is the same Herman Frasch to whom you have referred? A. Yes.

Q. These Frasch patents above referred to are offered and filed in evidence as exhibits, and marked "Sulphur Exhibits 7–a and 7–b."

Q. Mr. Keever, in speaking of the delivery of the sulphur at the surface by means of compressed air, did any water come up with that sulphur, and if so, what time?

A. There is usually a little water in advance of the first sulphur which came up, due to the water left in the sulphur pipe, and when the pipe was opened and after the well started producing sulphur there is no water as long as it produced sulphur.

Q. What would be the condition during intermediate normal pumping conditions of sulphur?

A. Almost pure sulphur. Outside of the moisture in the air I do not think there was any difference.

Q. You spoke about your pumping sulphur up to about 1924, what was the reason for discontinuing at the Sulphur Mine?

A. It became unprofitable to produce more sulphur on account of the exhaustion of the deposit of sulphur.

Q. Prior to 1907 did you know of the use of compressed air being used in conveying any other substance than sulphur, and if so, state what experience you have had with moving, [154] raising or lifting any other substance with compressed air.

A. Well, we lifted water, and we also lifted sand and gravel.

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Q. You speak of "we"; to whom do you refer?

A. Well, I mean the Union Sulphur Company.

Q. Where was that done and when?

A. I think it was in 1906 or 1907; I am not positive. It was done here about one-half mile north of the sulphur deposit, probably a little farther than that.

Q. What other experience have you had, or know of, lifting other substances by compressed air?

A. We also lifted mud laden water with compressed air, which we used in drilling wells. I was also shown a quantity of sand over at Crowley that came out of a well. I did not see it coming out, but the sand was there. The well was drilled by a man named Myron Abbott.

By Mr. WUPPER.—That portion of the answer relating to the sand coming out of the pump, or well, is objected to as hearsay evidence.

Q. Just describe what you saw at Crowley, with regard to the sand, etc.

A. Well, I saw a pile of sand that was probably eight feet high right around the well for about 125 feet, just a cone shaped body of sand which had been brought up out of the well.

Q. What else did you see at that place in the nature of rigging, etc.?

A. Well, there was nothing, only just the ordinary outfit to drill a well, and then there was a brick plant adjacent [155] to it.

Q. Who was in charge of the operation there?

A. I could not say who was in charge of opera-

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tions. Mr. Abbott told me he was a stockholder in the brick plant and I believe the brick company put down the well.

By Mr. WUPPER.—The answer is objected to as hearsay.

Q. What kind of a derrick did you say was in the center of this sand pile?

A. It was just the ordinary oil field derrick, shorter, probably a sixty-four foot derrick. I do not remember just the height of it.

Mr. WUPPER.—Objected to as hearsay.

Q. Did you see any machinery around the well?

A. I did not see any; if there had been any machinery there it would have been covered with sand, the casing came up in the center of the sand pile.

Q. Did you see any pipes?

A. I saw the well pipes that the well was cased with.

Q. Did you see any air compressor around there?

A. No.

Q. Have you had any experience, or know of any other place where sand, gravel, or other heavy material, has been moved with compressed air?

A. No. I do not recall any other.

Q. The testimony you have just given about the sand was at what place?

A. Crowley, Louisiana.

Q. Is that the same Mr. Abbott who was drilling a well for [156] the Crowley Oil & Mineral Company at Jennings?

By Mr. WUPPER.—Objected to as leading.

(Deposition of William R. Keever.)

A. The same man.

Q. Do you know of compressed air having been used in any brickyard? A. No.

Q. Now just tell about the way in which you used compressed air here at the Sulphur Mines other than for the use of lifting liquid sulphur?

A. In lifting sand and gravel a well was drilled down into the sand and gravel bed and cased with a ten-inch pipe. Then we tried flowing the sand and gravel through the ten-inch pipe with a one-inch air line inserted near the bottom of the well, and our first experience showed us there was not enough water to carry the sand and gravel out, so the one-inch air line was pulled out and a string of six-inch pipe put into the bottom of the well, and the one-inch pipe inserted inside of the six-inch and a flow of water was put down between the six-inch and a flow of water was put down between the six and ten inch pipes, and the air was introduced through the one-inch, which gave a satisfactory flow of sand, gravel and water through the six-inch. In pumping the mud laden water from the big pit for the use of drilling wells there was a four-inch pipe put down into the water and mud and the one-inch pipe put to the bottom of that, and the air turned on, and it flowed the water and mud out.

Q. What difference did you notice, if any, in the way the sand and gravel and mud laden water came through the pipe with reference to the way the sulphur came out of [157] the well into the pipe?

A. The sand and gravel and water came with a

(Deposition of William R. Keever.)

steady flow; if the mud was too dense or thick it would come for a little while in little gushes, but it would soon quit this and the water and mud would come in a steady flow.

Q. Otherwise, it would come intermittently, as the sulphur did?

A. No. It was a steady stream. All the water wells flowed steady after they started, and would keep a steady flow.

Q. In what respect did your equipment in pumping the sand and mud laden water by compressed air differ from the equipment used for pumping sulphur?

A. It was practically the same, except that the pipes used in the sand and mud operations were suspended from the top.

Q. At what depth did you pump this sand from?

A. Well, I would say something like four hundred feet.

Q. What depth did you pump the mud from?

A. It was thirty feet; the pipe was up above that, say thirty-six feet.

Q. Mr. Keever, I show you a small picture marked "Sulphur Louisiana, Defendant's Exhibit No. 8," for identification, and ask you if that illustration bears any resemblance to the sand delivery you have spoken of?

A. That is the way the flow came; water and sand and gravel out of the well; it blew straight out from it.

Q. Do you note any difference or similarity?

(Deposition of William R. Keever.)

A. It was similar in the steady flow of the water in the pipe.

Q. About how far did you deliver the sand, or blow the sand and water when you were pumping? [158]

A. I judge it would be around fifty or sixty feet.

Q. What was the size of pipe the sand was delivered in? A. Six-inch pipe.

Q. What air pressure did you use in pumping the sand?

A. Well, I think from three hundred to three hundred fifty pounds pressure.

Q. Defendant offers and files in evidence the photograph just referred to marked "Sulphur, Louisiana, Defendant's Exhibit No. 8" for identification.

Mr. WUPPER.—The photograph is objected to as immaterial, and irrelevant, not proven, and being on such a small scale as to be indistinct and illegible as to what it shows.

Q. What machinery did you use for compressing air back in 1902 and 1903.

A. We used air compressors of several different makes. We have the Ingersoll & Rand, Dunn, Laidlaw & Gordon, Hall and the Clayton.

Q. Do you remember where you got the Ingersoll compressor from?

A. I am not positive, but think we got them from the Jennings Oil Field; I think from Haywood Oil Company.

(Deposition of William R. Keever.)

Q. Who was the man who first used compressed air to produce sulphur, as far as you know?

A. Herman Frasch.

Q. And you yourself have used it since coming to the Sulphur Mines?

A. Since 1902, were using compresses air when I came here in 1902. I was here in 1902 and 1903 and saw the compressor running. [159]

Q. And you had charge of the pumping from what year? A. From 1905.

Q. Mr. Keever, did you look up to see the number of wells which were steamed and produced sulphur by the Union Sulphur Company, beginning with 1902?

A. I have not looked it up, but just for a few years.

Q. In all of the testimony you have given here you have not used any memorandum or reference, or consulted any document have you, except for the obtaining of information of the quantity of sulphur?

A. Only for the quantity of sulphur, and for the patents.

Mr. WUPPER.—The question is objected to as leading.

Q. Mr. Keever, have you the information as to how many wells were steamed and produced sulphur in the various years by the Union Sulphur Company, beginning with 1900 down to date?

A. I have the information in the records.

Q. Please state the number of wells, per year?

(Deposition of William R. Keever.)

A. In 1900, one well was steamed; in 1901, there were two wells; in 1902 there were two wells; in 1903 there were 11 wells; in 1904, there were 22 wells; in 1905, 19 wells; in 1906, 34 wells; in 1907, 27 wells.

Mr. WUPPER.—The answer is objected to as secondary evidence, incompetent and irrelevant.

Q. From where did you get the information as to the number of wells steamed?

A. From the records of the Union Sulphur Company's office.

Q. Those records are now in the Company's office? [160] A. Yes.

Q. What do you mean by a well being steamed?

A. I mean the hot water turned into the well from the plant for the purpose of liquifying the sulphur.

Q. When a well is steamed what does the well do.

A. It pumps sulphur if the hot water liquifies it.

Q. Did any of these wells fail to liquify the sulphur? A. Not that I know of.

Q. Then all of the wells referred to produced sulphur? A. Yes.

Q. What was used to bring the sulphur to the surface? A. Compressed air.

Q. Mr. Keever, in what other cases did you testify in which these various exhibits I have introduced in evidence, and now show you, and *mark* "Sulphur, Louisiana Exhibits One, Two, Three, Four, Five, Six, Seven–a, Seven–b, and Eight," were shown you and testified to about by you?

(Deposition of William R. Keever.)

A. It was in patent suit of the Union Sulphur Company vs. Freeport, Texas, and in California and Boston suits.

Q. Those same exhibits were shown to you in the California and Boston suits, then?

A. Yes, sir.

Q. By the California and Boston suits you mean the suits in which your testimony was taken the latter part of May, by Mr. Townsend and Mr. Bradbury?

Mr. WUPPER.—Question objected to as leading.

A. Yes, sir.

Cross-examination.

Mr. WUPPER.—Mr. Keever, to clear up a little ambiguity in the first [161] part of the record, you had a copy of the testimony which you gave the latter part of May in the suits of Concrete Mixing and Conveying Company vs. Stone & Webster, and in the suit of Concrete Mixing and Conveying Company vs. Great Western Power Company of California, before you at that time where you had ready reference to them, did you not?

A. I had it for about one or two questions, but it was immediately objected to by Mr. Wupper, and Mr. King took it away from me. I wanted to still keep it, but he would not let me have it.

Q. Mr. Keever, what was the consistency or viscosity as it came from the discharge pipe of the well? A. I never had it tested.

Q. Please compare it to some common, well-known substance.

(Deposition of William R. Keever.)

A. Well, it varied. When the temperature of the sulphur was right, the flow of sulphur, or the sulphur itself, was about like thin molasses.

Q. Would you say it was of about the consistency of heavy lubricating oil?

A. No, it flowed more freely than heavy lubricating oil.

Q. Did you ever at any time pump solid sulphur from the well? A. Hard sulphur?

Q. Solid, hard sulphur? A. No, sir.

Q. You state that you customarily forced hot water into the sulphur well, at what pressure did you force this water into the well casing?

A. It usually went into the well at boiler pressure, which was usually one hundred pounds. [162]

Q. In connection with the pumping of sand from the well on the property of the Union Sulphur Company about which you testified, would you say that the sand was suspended in the water similar to that manner in which it is carried along a rapidly flowing river?

A. It was suspended in the water, and brought along by the air pressure.

Q. The same was true about the dredging operations about which you testified where you raised mud?

A. Well, in flowing water, or mud or sand, the air goes into the liquid, which lightens it up and causes it to flow.

Q. Then in connection with all of your pumping operations that you conducted and testified about

(Deposition of William R. Keever.)

the raising of the matter was due to the difference in the weight of columns on the outside of the discharge pipe and that of the matter on the inside of the discharge pipe; is that true?

A. Well, it would never flow unless the air was introduced and of course when the air was introduced it lightened the column that was to be flowed and brought it out.

Q. Then it was true that the flow was due to the difference in the weight of the two columns?

A. Yes.

Q. Then the only way you could get a difference in the weight of the two columns was in the way the air was introduced into the two columns?

Q. After the air was introduced then the flow would be due to the difference of the weights in the two columns?

A. Well, I could not say that was so; I had no way of weighing it.

Q. In connection with the raising of mud concerning which [163] you testified you said that the mud was raised thirty-six feet approximately, by that you meant that where the water was approximately thirty feet deep you raised mud from that body of water so approximately six feet above the level of the water?

A. Yes. But you can plug the bottom of your line absolutely tight and flow out of it with the air, which shows that it is not an equilibrium.

Q. I show you here Sulphur Exhibit No. 3, and ask you when the original from which this copy

(Deposition of William R. Keever.)

was prepared was made? Approximate date will be sufficient.

A. I do not see that I can say even approximately when it was made.

Q. Was it before or after 1907?

A. It could have been before that, or it could have been after.

Q. In other words, you have not the faintest idea when it was made?

A. No, I could not say when it was made.

Q. When was the photograph of Defendant's Sulphur Exhibit No. 4 taken?

A. Well, I could not say, but I judge around about 1902.

Q. I hand you here Defendant's Sulphur Exhibit No. 8, and ask you if you know anything concerning the taking of the picture represented by that exhibit?

A. No, I do not know what that represents. It is only comparative.

Redirect Examination.

Mr. KING.—Mr. Keever, did you ever get any sulphur out of these [164] wells without putting compressed air in them?

A. Not since I have been here.

Q. Then you never brought any out by the forcing of hot water into the wells?

A. It has never been done since I have been here.

(Deposition of Samuel W. Maxwell.)

Q. You did put hot water into the wells and it never brought out any sulphur? A. No.

Q. What was it that brought the sulphur out?

A. Compressed air.

DEPOSITION OF SAMUEL W. MAXWELL, FOR DEFENDANT.

SAMUEL W. MAXWELL, a witness for defendant, whose deposition was taken at Sulphur, Louisiana, on August 30, 1927:

My name is S. W. Maxwell; I am 53 years of age and I reside at Sulphur Mines, Louisiana. I am Assistant Secretary of the Union Sulphur Company; I know in a general way that prior to 1907 the method used by the Union Sulphur Company in mining sulphur was "melting the sulphur by means of hot water and raising it to the surface by means of compressed air." My earliest experience in observing the pumping of wells by compressed air was in May, 1903. The sulphur came out of the ground from these wells in liquid form, coming out in gushes or slugs, I would call them. I first observed this pulsating action of the sulphur coming out in gushes in May, 1903. There was no difference at all in the way in which the sulphur came out of the ground in 1903 and 1907, or even later on. Compressed air was used in both years.

Q. Have you ever observed or had any experience in moving or lifting any other substance than sulphur by compressed air? [165]

(Deposition of Samuel W. Maxwell.)

A. I have not.

Q. You did not see any other material being moved?

A. Yes, I was there as an observer through courtesy.

Q. To what do you refer?

A. I saw them pump what we call the sand and gravel well just north of the Sulphur Mines; saw them pipe air into that well, and saw it flow out sand, water and gravel.

Q. What company operated the well you refer to as bringing up the sand, gravel and water?

A. Operated by the Union Sulphur Company, under direction of Mr. Keever.

Q. What machinery was necessary and used in bringing up the sulphur by the Union Sulphur Company? A. After the sulphur was melted?

Q. Yes. A. Compressed air.

Q. Were they using compressed air when you first came here? A. They were.

Q. About what was the size or weight of the original compressors they were using when you first came here?

A. A very small one, a little Clayton Compressor, weighing several thousand pounds; very small.

Q. Do you recognize this picture "Sulphur Exhibit No. 4," and if so, state what you recollect?

A. Yes, I recollect it. I had the picture taken.

Q. Do you know when it was taken?

(Deposition of Samuel W. Maxwell.)

A. Either in 1903, or the early part of 1904, but I think in May or June, 1903.

Q. Does the picture fairly represent what it appears to be, that is a sulphur well? [166]

A. It does.

Q. What is shown being delivered from the pipe?

A. Sulphur is being discharged from the three-inch pipe by means of compressed air?

Q. What is being discharged from the pipe that looks like it is flowing into a wheelbarrow?

A. That is water.

Q. How do you account for the appearance of the sulphur coming from the end of the pipe?

A. It is nothing more or less than a gush of sulphur, and that is guaged by the volume of air coming up through the three-inch pipe with the sulphur.

Q. You state that the sulphur came up in slugs, or intermittently, how do you account for the appearance of the sulphur in this picture?

A. The picture just happened to be taken as the sulphur gushed from a three-inch pipe.

Q. Is there any connection between the water well which you have referrd to and the sulphur well? A. None at all.

Q. Do you know whether the water well in the picture is an artesian well or pumping well?

A. Artesian well.

Q. Flowing of its own accord?

A. Of its own accord.

(Deposition of Samuel W. Maxwell.)

Q. What is the white substance in the bin, or board walls of the picture? A. Sulphur.

Q. In what form?

A. Part of it is solid sulphur, and immediately under the [167] discharge pipe is liquid sulphur. The bin immediately in front is congealed sulphur.

Q. About how large are these bins?

A. Well, that one looks to be about thirty-six feet square. There are four of these together. It was approximately that, anyway.

Q. How high above the ground was the sulphur pumped by compressed air?

A. When I first came here in 1903, we rarely pumped it up over three or four boards, for fear it might break loose and burst the side of the bin and get away from us. Later on we put them up to six and eight feet high, and later on to sixty feet high.

Q. By compressed air?

A. By pumping the sulphur into those bins by compressed air.

Q. Did you know Mr. Herman Frasch?

A. Intimately.

Q. Where is he now, is he living?

A. No, Mr. Frasch is dead. He died in 1914.

Q. Did you know Mr. Jacob C. Hoffman, who was a witness in the case of the Union Sulphur Company vs. Freeport, Texas Company?

A. I knew him.

Q. Is he living?

(Deposition of Samuel W. Maxwell.)

A. No, Mr. Hoffman is dead.

Q. Did you know Mr. Jacques Toniette, who was a witness in the above-mentioned case?

A. I knew him well.

Q. Is he living?

A. Mr. Toniette is dead. [168]

Q. Mr. Hoffman and Mr. Toniette were employed and worked for the Union Sulphur Company, did they not?

Mr. WUPPER.—Objected to as leading question.

A. Yes.

Q. What did they run steam down into the sulphur well for? A. To melt the sulphur.

Q. Did the steam commingle with the sulphur and come out with the sulphur?

A. It did not except on the occasions where the sulphur was exhausted, then the well would "blow," as we call it, and steam would come out of it.

Q. When the liquid sulphur was exhausted the steam would come out of the discharge pipe?

A. Yes.

Q. What would that indicate?

A. That we had pumped out the melted sulphur or it might mean the absence of any sulphur at all.

Q. I understand that when the well was being properly pumped no steam came with the sulphur?

A. No steam came with the sulphur.

Q. How long have you held your present office with the Union Sulphur Company?

A. Abount twenty-four and one-half years.

(Deposition of Samuel W. Maxwell.)

Q. Who was the man who first produced sulphur by compressed air process? A. Mr. Frasch.

Q. Herman Frasch?

A. Herman Frasch. [169]

Cross-examination.

(By Mr. WUPPER.)

Q. What was the density or viscosity of the sulphur that came from the discharge pipe of the well? A. I do not know.

Q. Please compare the density of the sulphur as it came from the discharge pipe of the well with that of some well-known substance?

A. It looked like thin syrup or discolored water, but that would depend, of course, on the condition of the sulphur, *it* it was molten and in its proper state, then it would look like rusty water or thin syrup.

Q. You have some of the equipment which you used, which is the same, or similar to that used back in 1903, 1904, or 1905, still on the ground?

A. We have. One machine only, now.

Q. The sketches and testimony of Mr. Keever and Mr. Maxwell regarding this equipment are objected to as secondary evidence in view of the witnesses' testimony that the sample of the equipment used is still in existence.

Q. Did you ever pump solid, that is, hard sulphur, from the wells? A. No.

(Deposition of Samuel W. Maxwell.)

Redirect Examination.

Mr. KING.—That machinery you spoke of would be rather unwieldy to take to Washington and introduce into court as evidence, would it not?

A. I should say. It weighs between 2,500 and 3,000 pounds.

Q. You testified that you saw them pump sand, water and gravel by compressed air, what would you have to add to [170] that to make concrete?

A. Cement.

Q. What is the nature of sulphur after it has been brought to the surface and congealed?

A. It is a hard mineral, having an aerated appearance, due to the air in the sulphur at the time it is discharged into the bin.

Q. Is it in a crumbled state, or otherwise? If not, explain its condition.

A. After the liquid sulphur is discharged into the bins it congeals into a solid mass, but when broken open has the appearance of being aerated. In that condition it weighs around one hundred and ten or one hundred fifteen pounds per cubic foot. When broken up, ready for shipping, it weighs about eighty pounds per cubic foot.

Q. Do you know the nature of the sulphur in the ground?

A. It is in honeycomb form, in rock.

Mr. WUPPER.—This question and answer are objected to as not relating to the subject matter brought out in the cross-examination.

(Deposition of Samuel W. Maxwell.)

Recross-examination.

Mr. WUPPER.—Without waiving any objections previously made I would like to ask Mr. Maxwell a few more questions.

Q. Mr. Maxwell, in connection with the pumping of water containing sand about which you testified that you had made some observations, how was the sand carried. Might it be considered as carried in suspension as the air raised the water from the well?

A. From my little knowledge of engineering I would say that it was suspended in the water as it is discharged from [171] the pipe by means of the compressed air.

Q. Mr. Maxwell, would you have any objection by the use of the defendant in this case to a set of equipment such as you have used in sulphur mining?

Mr. KING.—Objected to as irrelevant, immaterial and impractical.

A. I refer that to Mr. Keever, the vice-president.

Q. You ordinarily have charge of such things, and have more or less the disposition of the property that is now being used?

A. To a certain extent. This is not the ordinary case.

Mr. TOWNSEND.—The Sulphur, Louisiana, depositions are late. Mr. Keever is the vice-president of the Union Sulphur Company and Mr. Maxwell is the secretary of the Union Sulphur Company

at Sulphur, Louisiana. Their testimony relates to the pumping or moving of sulphur by compressed air from depths of five hundred feet to fourteen hundred feet and the prints that we have in evidence will show how that mode of operation was carried on. The witnesses show that from the year 1903 up until the time of this patent and long afterwards the pumping of sulphur, one of the most difficult substances to handle, could only be done and handled by compressed air and working on the McMichael principle.

The witnesses further show that the so-called slug action that those witnesses thought might occur was a regular and practiced habit of sulphur; that the sulphur came from these great depths in molten form where it had been melted by super-heated water at [172] about three hundred degrees Fahrenheit so that the sulphur stood at a temperature between two hundred and thirty-five degrees Fahrenheit, the melting point of sulphur, and three hundred and ten degrees, at which point sulphur became tarry and sticky and could not be moved, and that this sulphur mining industry, great as it is in the United States to-day, was founded by Dr. Frasch, a worker in this field, who had worked in the oil fields and used the oil—and used air compression before, and developed the fact that when there is molten sulphur coming around the bottom of the well, in molten form, acted upon by compressed air, it could be and was brought to the surface in merchantable quantities—in great quantities, and millions of tons was pumped by com-

pressed air and resulting in an outflow of pulsations up to the year 1907.

These same gentlemen also on their properties there at Sulphur employed the compressed air method for pumping sand and water and sand, mud and water, and where they had a thick, muddy substance they had also a pulsating action. That this was a very common and notorious use of pumping sand and water from great depths by compressed air. The next depositions on file and which we formally ask to be admitted are the depositions of four substantial business men at Crowley, Louisiana, some fifty miles from Sulphur,—

The COURT.—(Interrupting.) You say they are here?

Mr. TOWNSEND.—Yes, your Honor. At Crowley, Louisiana, and they relate to a use at the Crowley Brickyard [173] Company of pumping sand and water for brickyard purposes in the year 1902, and this sand and water was pumped in commercial quantities.

The COURT.—What sort of an action?

Mr. TOWNSEND.—The action is not described in these depositions. I would say that in the other case on cross-examination our friends found out that the action of pumping there was a pulsating action. They used an eight-inch pump and Mr. Landers, one of the witnesses in these depositions, described the pumping action. Mr. Bradberry and I were both present when he testified and said that the pumping action by air was a pulsating action.

(Deposition of Hicklin J. Landers.)

Those depositions are offered and are asked to be considered.

Mr. WILLIAMS.—Would Counsel, I wonder, name at least the depositions that he is offering? I got the name of one I understand, Maxwell—someone like that.

Mr. TOWNSEND.—These depositions are the depositions of Joseph G. Medlenka, Jack Frankel, Kicklin J. Landers and John Green.

The COURT.—Are they officially here?

Mr. TOWNSEND.—Yes, sir; in the Clerk's office.

The COURT.—This pumping was of sand and water, you say, in 1902. Pumping is not new, as far as that goes.

Mr. TOWNSEND.—Pumping by compressed air, no, but this is another form of so-called pumping. Now, the word "pumping" is the blowing. That is all that was. It was the blowing of this liquid or liquified form by the action of water, so we won't use the word "pumping," and we have no reference to any mechanical devices [174] other than the pipe to hold the liquid and a pipe to serve the air.

DEPOSITION OF HICKLIN J. LANDERS, FOR DEFENDANT.

HICKLIN J. LANDERS, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August 31, 1927:

My name is Hicklin J. Landers; I am past 60 and my residence is Crowley, Louisiana. I do not

(Deposition of Hicklin J. Landers.)

know what my occupation is; I am vice-president of the Acadia Iron Works, you might say I am purchasing agent of the Acadia Iron Works. I have lived in this community about 34 years; I have had experience in pumping minerals by compressed air. About 1885 or 1896 I was engaged in rice farming down in Vermillion Parish and we decided to put in a deep well and pump water by compressed air, which we did—put in an eight-inch well. That was my first experience with compressed air. The well was 200 feet deep as I recall it. We didn't know quite as much then about putting down wells as we do now. We didn't go as deep. We got along all right pumping water. It proved all right, the only trouble was that after we pumped a certain length of time it pumped sand and water. We kept pumping until we pumped out so much sand that all the ground around our well caved in, I suppose for 30 or 40 feet in diameter. That suspended our operations. To operate the machinery for pumping the water we used a steam engine and connected it with the air compressor; there was a steam pipe that run down inside of the well that forced the compressed air into the well and forced the water up—raised the water up with air—compressed air raised the water up and threw it out. The make of air compressor used was, I think, an Ingersoll-Rand. This well was located in Vermillion Parish, Louisiana. I do not know where that air compressor is now. After our well caved [175] in on us it was useless and we dis-

(Deposition of Hicklin J. Landers.)

posed of it to the Crowley Brick Company, I believe it was. Our well caved in and we couldn't use it any more was the only reason. We could not use it unless we put in a new well and we did not feel like doing that. After we disposed of it, I saw it once at the Crowley Brickyard pumping sand. It was pumping sand the same as it pumped water. They used the same principle, compressed air forced the sand to the top and lifted the sand out. The witness was asked if he had ever seen a compressor pumping any other substance than the water and sand he spoke of and answered, "Well, only at a distance, I have seen them working an oil well, but I have not been close to them." That was out around the Evangeline fields.

Q. Now, you speak of pumping sand and water by compressed air,—just explain in detail how the compressed air worked?

A. Well, I don't know as I can go into the fine points as to the compressed air. I know we had a steam engine hooked to the compressor and that a pipe down in the well, I don't remember just how deep, but probably 150 or 175 feet, and the air forced, when the air went down and out through the bottom the compressed air raised the water to the surface and it flowed out.

Q. That is what you mean by pumping?

A. Yes, that is what we mean by pumping.

Q. How near the surface of the ground did the water stand in the pipe of this water well?

(Deposition of Hicklin J. Landers.)

A. Well, down in that section in ordinary times I suppose the water came within twelve or fifteen feet of the surface,—it is only about ten or twelve feet above sea level, and I should say the water would stand about fifteen feet from the surface in ordinary times. Of [176] course, in dry seasons it was some lower.

Q. And you say, I believe, that this compressed air also forced out a lot of sand? A. Yes.

Q. What size pipe did the sand come out of?

A. The sand came out of the same size pipe as the water, about an eight-inch pipe.

Q. After the water came to the surface how was it discharged,—in what manner?

A. I had a discharge pipe on the pipe in the well and it would run out through that.

Q. Perpendicular or horizontal?

A. No, horizontal.

Q. When was this experience you had in pumping the water at your place in Vermillion Parish,—what year?

A. It was,—I can't remember exactly when it was, 1895 or 1896. It was about that time, either 1895 or 1896.

Cross-examination.

(By Mr. WUPPER.)

Q. In your well in Vermillion Parish about which you testified, what was the diameter of the casing?

A. It was eight inch.

Q. And the diameter of the air pipe that went down into the casing?

(Deposition of Hicklin J. Landers.)

A. I don't remember, it may have been about a three-quarter inch.

Q. How far down did the air pipe go?

A. I don't remember exactly, I should say possibly 150 to 175 feet, something like that. It might have been a little deeper or a little less. [177]

Q. What pressure air did you use?

A. I don't remember.

Q. How did you drive the air compressor?

A. With a steam engine?

Q. Was it directly connected to the compressor?

A. Yes, direct connections.

Q. By that you mean by belt? A. Yes, belt.

Q. What proportion of the material that came out of the well was sand and what proportion was water?

A. Well, I can't state just the proportion, only it worked all right, it was mostly all water in the beginning and then it began to be more sand, and more sand and water mixed, and then it come to be about half sand and half water, and kept coming that way until it caved in on us.

Q. Would you say that the sand was carried in suspension by the water?

A. Yes, it came up with the water. The sand and water came up together.

Q. How long did you operate that well in the Vermillion Parish?

A. Possibly a couple of months, six weeks or two months, from the time we started until it caved in. If it had not caved in we would have kept on.

(Deposition of Hicklin J. Landers.)

Q. You did not want the sand?

A. No, we wanted water. We installed it as an irrigation well to flood rice. We wanted water, not sand. In those times that was a new thing, none of us had any experience about it and we did not get the right kind of strainer, I suppose. We did not know anything about making strainers to keep sand out. [178]

Redirect Examination.

(By Mr. KING.)

Q. You did not know much about air compressors in those days?

A. No, sir, not as far as we were concerned, we did not know. We found that they pumped water all right if we kept the sand out.

DEPOSITION OF JOHN GREEN, FOR DEFENDANT.

JOHN GREEN, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August 31, 1927:

My name is John Green, I am 78. I will be 79 next month, October. I live in Crowley, Parish of Acadia, Louisiana. My occupation is handling grain, flour, and feed of all kinds at wholesale. The witness was asked if he had ever been interested in or connected with any brick concern and if so, what, and answered that he was interested in the Eckard Manufacturing Company and that the Crowley Brick Company was a part of the Eckard

(Deposition of John Green.)

Manufacturing Company. That was somewhere about 1902 to 1904, somewhere along there. The witness, upon being asked who else was interested in the Crowley Brick Company, replied "Mr. Medlanka and Mr. Frankel."

Q. In what capacity were you interested in that brick company?

A. I was a director in the company,—I think I was.

Q. Did the Crowley Brick Company ever use any air compressor in any operations?

A. Yes, for a short time, I believe.

Q. Just tell us what you know about their using an air compressor?

A. I never went there but once. I had no experience with it.

Q. Just state what you learned and saw when you were there?

A. When I was there they started pumping pretty soon after [179] I went there and I noticed it rolled out and the sand pretty lively. I was standing near and had to move away, as it was shoving it out pretty lively.

Q. Did it bring out anything besides sand?

A. Oh, there was some water mixed with it, but the body of it was sand,—there was some water all through it.

Q. You know how deep the well was?

A. No I don't. I know it was quite a depth, but how deep I don't know.

(Deposition of John Green.)

Q. What were you trying to obtain from that well by the use of compressed air?

A. I think they were trying to get water for brickyard purposes. I paid very little attention to it. I had other interests I was looking after, but I know they had this well.

Q. You know that it pumped out water and sand?

A. Oh, yes, I stayed quite a little while there at that time. It was interesting to me to see it work.

Q. Did you see the machinery they had there?

A. Yes, I saw the machinery but paid very little attention to it.

Q. About how long did the operations of taking sand out of the well by compressed air last?

A. I could not say how long they operated it. They must have been at it two or three months, more or less. I was only there at that particular time and then I stayed quite a while to see it operating and it was shoving up sand pretty lively.

Q. You don't know anything about the methods of the operation? A. No, I don't. [180]

Q. Do you know why they discontinued using it?

A. When it caved in.

Q. What caved in?

A. The well caved in around the pump.

Q. You mean the ground caved in?

A. Yes the ground caved in.

Q. You say these operations were back in about what time?

A. It was somewhere about 1904 or 1905,—somewhere between 1900 and 1905.

(Deposition of John Green.)

Cross-examination.

(By Mr. WUPPER.)

Q. You said that they pumped sand and water. You saw it being pumped out of the well at the Crowley Brick Co., would you say that the sand was carried in suspension by water as it came out?

A. Oh, no, it shoved it out away from there.

Q. About what proportion of the mineral which came out of the well was sand?

A. Why I would say it was at least seventy-five per cent sand. It seemed to be almost solid sand just running out of the pipe. There was water mixed with it. It was so much sand it would kind of pile up,—if there had been so very much water it would have washed away.

DEPOSITION OF J. G. MEDLANKA, FOR DEFENDANT.

J. G. MEDLANKA, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August 31, 1927:

My name is Joseph G. Medlanka. I am 57 years old, live in Crowley, Louisiana, and I am a lawyer. I have engaged in the practice of law since 1899. I was president of the Crowley Brick Company from 1901 to 1902, probably 1903. The [181] witness, upon being asked, "Do you remember the date of the incorporation of the Crowley Brick Company?" answered "I think it was about 1901. It has been so long ago." It was a Louisiana

(Deposition of J. G. Medlanka.)

corporation and its business was brick manufacturing.

Q. Have you ever had any experience of moving, or pumping or conveying minerals by compressed air?

A. Yes, our company undertook that. In the manufacture and sale of bricks we had quite a demand for sand, cement and material of that nature, gravel, etc., and Mr. J. Shoemaker, who was vice-president of our corporation, who is now dead, and Mr. Abbott, one of our stockholders, conceived the idea, from experience in these deep water wells that sand and gravel could be extracted from the depths of the earth and that this section contained a great deal of it. Their idea was to extract it by the operation of an air compressor, at that time Mr. Landers and Mr. Donnolley had an abandoned air compressor on their farm located in Vermillion Parish, and we purchased from them this air compressor, installed it at our brick plant in Crowley, having previously sunk a well to a depth of about 175 or 200 feet, setting the end of the casing in what was considered a good strata of sand and gravel and operated that well with this air compressor, extracting from the well a good deal of sand and gravel, which came up with the water.

Q. Do you know anything about the mechanical features of the well, size of pipe, etc., used.

A. Well, I know that the pipe from the air compressor was placed in the well going down into the casing and set in the strata of sand and gravel.

(Deposition of J. G. Medlanka.)

My recollection is that [182] the end of this pipe had an elbow and, of course, that tended to blow the sand and gravel up.

Q. About what size was the casing?

A. The casing,—I think the casing was ten inches,—it may have been an eight inch. Its been so long ago and the Crowley Brick Company does not exist any longer. It has been out of business probably 22 or 23 years now.

Q. When was it that these operations of pumping sand that you tell about by compressed air were conducted? About when?

A. Well, that was about 1902.

Q. Do you remember the kind of compressor used?

A. No, I don't remember the name of that. As I was going to say just now, our company has been out of business for over twenty years and some time ago in cleaning up my office I just destroyed all those records; all invoices, all receipts, correspondence, etc.

Q. Do you remember what the Crowley Brick Company did with that compressor?

A. They sold it.

Q. Do you remember who they sold it to?

A. No.

Q. About how long did they operate the compressor in this manner pumping sand?

A. Not more than a week for the reason that when they extracted the sand and gravel out of the well it caved in. The surface caved in. They

(Deposition of J. G. Medlanka.)

had to abandon that,—they found it was impracticable for that reason.

Q. About what quantity of sand was obtained at that time?

A. We estimated it was about ten or fifteen carloads. [183]

Q. Do you know the depth from what the sand was brought up?

A. The well was about 175 or 200 feet deep.

Q. Now, do you know what was in the bottom of this well where the end of the large pipe and the small pipe were?

A. They had no screen on it. The idea was to have the sand and gravel flow into the end of the casing and as it flowed in it was pumped out by the compressor. Of course, water, sand and gravel came in together.

Q. Now, just tell us what you know about how this sand and gravel was forced or pumped?

A. It was forced out by the air compressor. The air compressor forced air down through this pipe in the casing. It has a return elbow piece of pipe at the end. This sand and gravel, together with water, was forced to the surface and at the top there was an elbow on the end of the pipe that shoved it out on the land away from the derrick.

Q. Have you ever seen any other minerals being pumped, forced or conveyed by compressed air?

A. No, sir.

Q. Was that a common use of compressed air when you were using it that time for that purpose?

(Deposition of J. G. Medlanka.)

A. No, it was used for the purpose of pumping water, in forcing water up by air for the irrigation of rice land. I believe a short time after that the air compressor was used in the Evangeline oil field and I am rather under the impression that this compressor that we owned was sold to somebody in the Evangeline oil field and used there.

Q. You say that the well from which you pumped sand and [184] gravel was about 175 feet deep?

A. It was around 175 feet,—it may have been a little less than that.

Q. Was the sand and gravel that you pumped in the bottom of the well, or was it up higher?

A. It was at the bottom. Of course, there are several strata of sand and gravel, and I presume,—I am not a well man and don't know anything about the operation of the well how this was arrived at, or anything else, but from my general knowledge, and obtained from those in charge at that time, the end of the casing was set practically at the bottom of a gravel and sand strata and as the sand and gravel was pumped out it would flow to the bottom and then forced out.

(Objected to by Mr. Wupper as hearsay.)

Q. How deep did the water stand around the casing in that well?

A. The water came up within twelve feet of the surface, depending altogether upon the season. If it was a very dry season the water was very much lower.

(Deposition of J. G. Medlanka.)

Q. The water level in this section of the state is rather low, is it not?

A. They say during dry seasons the water goes down to about, around this immediate section, to about 28 or 29 feet from the surface.

Q. Will you give us an idea of the conditions as you know them as to the sand and water levels and sand and gravel stratas in this territory.

A. They strike gravel—a good strata of gravel and sand at about 150 feet, and first strata, and they strike them [185] at 225 feet, strike them at 275 feet, and at 300 and 350 feet.

Q. How do you fix the date of these operations you speak of by the Crowley Brick Co., as being about 1902?

A. We organized,—Mr. Carmouche looked that up before,—we were organized in 1901,—the latter part of 1901, I believe it was in the fall of 1902 when we undertook this operation.

Q. How long did the company stay in business?

A. We did not stay in business very long, until 1903, probably 1904. You know in going back into memory so far as these years are concerned and having no records at all to go by it is a pretty hard matter for me to be exact, but I am sure it was not later than the latter part of 1903.

Q. Do you know where Myron Abbott is at the present time?

A. No, I do not,—some time ago he was supposed to be at Maraugouin, over there in the flooded district.

(Deposition of J. G. Medlanka.)

Q. Do you know what the Crowley Brick Company did with that compressor? A. Sold it.

Q. Do you remember who they sold it to?

A. No, I don't remember.

Q. You spoke of having purchased that air compressor from a Mr. Landers, is that the same Mr. Landers who was here a while ago?

A. Yes, sir.

Q. He is presently connected with the Acadia Iron Works?

A. Yes, and it was bought expressly for the purpose of extracting this sand and gravel. [186]

Q. Who else was interested with you at that time in connection with the brick company?

A. There were Myron Abbott, Jack Frankel, J. F. Shoemaker, A. Kaplan, W. E. Lawson, O. E. Eckard,—

Q. Was John Green connected with it?

A. Mr. Green, yes.

Q. Where are Mr. John Green and Mr. Frankel at this time?

A. At Crowley,—there were also some New Orleans people interested in it, Mr. I. N. Nickelstein.

Q. Mr. Jack Frankel you spoke of there is the same man here present, and also Mr. Green.

A. Yes.

Q. Why did you quit operating that well,—pumping sand from this well?

A. Because of the cave-in. When we started these operations we thought that the upper structure of the well,—that is above the sand and gravel

(Deposition of J. G. Medlanka.)

strata from which we extracted the sand and gravel would remain intact and form a solid foundation and we could extract all sand and gravel we wanted to, but we found that it would not do it,—it caved in so as to make the operations very expensive.

Cross-examination.

(By Mr. WUPPER.)

Q. You testified that the sand came out with water in the Crowley brickyard well. What proportion of the total discharge was sand,—approximately?

A. From my observation, and I watched it during the process of operation, I would think that it was about 50–50.

Q. Fifty parts water and 50 parts sand and gravel?

A. Yes,—I was president of this corporation and Mr. Shoemaker [187] was vice-president, and we were very much interested in this because it meant a great deal to us if we could succeed and we watched the process very carefully, and we were very much disappointed when we had to give it up.

Q. The operation was really unsuccessful as a whole?

A. Well, yes, due to the fact that the cave-in occurred, not due to the process that we had of extracting because the air compressor certainly got the sand and gravel out of that hole.

Q. What kind of an air compressor did you use at that well? A. I don't remember the name.

(Deposition of J. G. Medlanka.)

Q. What air pressure did you use?

A. I don't remember that.

Q. Please describe the compressor if you don't know the name.

A. Well, it was what you call a horizontal, the pump that created the air lay horizontally and it was a pretty large machine,—operated from the fly belt of our engine.

Q. What kind of an engine did you use?

A. We had—now I can remember the name of that engine all right, it was a Brownell.

Q. What size engine was it?

A. It was 125 to 150 horse-power.

Q. Is any of that casing or air pipe eqipment that you used at that time in existence at the present time?

A. I couldn't say. We had a drying plant in connection with our brick plant, all consisting of pipe. We sold it all together to a man by the name of Dunn in Lake Charles. I don't know if he took all the pipe or not, whether he extracted it from the well,—we abandoned it. [188]

Redirect Examination.

(By Mr. KING.)

Q. Is the hole still there?

A. I could not say whether it is or not,—I think the cave-in could be located.

DEPOSITION OF JACK FRANKEL, FOR DEFENDANT.

JACK FRANKEL, a witness for defendant, whose deposition was taken at Crowley, Louisiana, on August, 31, 1927:

My name is Jack Frankel, of Crowley, Louisiana, occupation something of a general utility man. I am President of Bank of Acadia, President of Crowley Oil & Mineral Company, and various other institutions, and I am about 65 years old and have lived in Crowley a little over 40 years—ever since the town was started. I was connected with the Crowley Brick Company in the capacity of stockholder and director. The company was organized somewhere between 1900 and 1903, I think, and it existed for about two years, I think two years and a half. Mr. Green and Mr. Medlanka were associated with me at that time in the Crowley Brick Company.

Q. Have you had any experience of using compressed air for moving of minerals,--heavy minerals? A. Yes.

Q. Please tell about your experience.

A. The first time that we ever used compressed air here was in connection with the Crowley Brick Company. As I remember it, the clay of which the bricks were made here was a little too rich and it was suggested that if we could procure sand to mix in with the clay we could make a better brick, avoid the brick cracking during the process of

(Deposition of Jack Frankel.)

burning, and also have some sand for sale. We [189] heard of a water well that had been put down for the purpose of irrigating rice using an air compressor and it developed during the pumping season that the well made a great deal of sand, —in fact so much of it that it began to cave in and they had to abandon this process. We got in touch with these people and procured this air compressor and put down a well to the first sand and gravel strata, set the casing and started to operate the machine and it worked very successfully,— pumped out lots of sand and some gravel until it began to cave around the casing and as we operated the cave got larger, extended larger and larger in circumference until it threatened,—in fact, it put the derrick out of alignment so we had to stop.

Q. What kind of an air compressor was used, do you know?

A. I am not sure, but I think it was an Ingersoll-Rand.

Q. Did you see this well in operation?

A. Yes.

Q. Did you see the sand that came out of it?

A. Yes.

Q. You say that large quantities came out,— what do you mean by large quantities?

A. Oh, possibly 10 or 15 carloads. It piled up quite a hill around the area where pumped.

Q. Do you know how the compressor was operated, and how the well was operated,—if so, please explain to us how it worked.

(Deposition of Jack Frankel.)

A. The compressor was driven by a belt from the engine, the compressed air forced down into the bottom of the well and the returns that came up were mulsified composed of water, sand gravel. Of course, the water would run off and the [190] solids would accumulate on the surface of the ground.

Q. Why was it the Crowley Brick Co., discontinued the use of producing sand by this method?

A. On account of the well caving in. The more they took out the larger the cave got.

Q. Have you had any experience of moving any other substance besides gravel and sand by compressed air?

A. Later on we used compressed air in the oil field where we pumped quite a number of wells by compressed air.

Q. What was done with the air compressor that you had at the Crowley Brick Co.?

A. Disposed of same with the other machinery we had.

Q. Do you know to whom?

A. No, I am not sure.

Q. Was there any difference in the manner of using compressed air to move the sand and gravel and the oil that you speak of?

A. Not very material; no.

Q. Now, about when were these operations that you speak of moving sand and gravel by compressed air by the Crowley Brick Co.?

(Deposition of Jack Frankel.)

A. Shortly after we started operating,—perhaps six months after we started operations.

Q. And you started operations about when?

A. Well, I am not sure when, we started operating possibly three months after we were organized.

Q. When were you organized?

A. I don't remember, some time between 1902, 1902 or 1903.

Q. Can you put the outside limit?

A. The outside limit is between 1900 and 1903. [191]

Q. How did *you* sand and gravel come out of the pipe, in what manner?

A. It came out in mulsified form,—a pretty thick liquid.

Q. Do you know how deep the well from which the sand and gravel was pumped was?

A. It was somewhere between 150 and 175 feet.

Q. And the sand and gravel in the well you speak of was brought up from what depth?

A. From the bottom.

Cross-examination.

(By Mr. WUPPER.)

Q. The well which you had in the Crowley brickyard was similar to the compressed air water well, except that it did not have a strainer?

A. I presume so.

Q. And it worked approximately the same as a water well, except that it carried the sand up with it? A. Yes.

(Deposition of Jack Frankel.)

Q. You might say the sand was suspended in the water?

A. No, sir; the sand was mulsified very strongly with the water. It was pretty thick. It came out in gushes acting on the impulses of the machine.

Q. What proportion of the discharge from the pump was water would you say?

A. It was very thick, I should judge running around—it is pretty hard to tell—but not less than fifty per cent of it was solid matter.

Redirect Examination.

(By Mr. KING.)

Q. You spoke in answer to Mr. Wupper's question about the [192] sand and gravel coming out in gushes, how did it appear?

A. Well, it would act in connection with the impulses of the machine. These machines work with a piston and as the air was forced into the well it would react below and it would come up to the surface.

Q. Would it slack up at times?

A. It would slack up just the least bit.

(The witness here demonstrated with his hands as coming out in gushes.)

When the air was forced down it would come up in heavy discharge.

Q. You are not sure what made it do this, this is only speculation on your part? A. Yes.

Q. You would say then it came in pulsations?

A. Yes.

DEPOSITION OF EDMUND M. IVENS, FOR DEFENDANT.

EDMUND M. IVENS, a witness for defendant, whose deposition was taken at New Orleans, Louisiana, September 1, 1927 (Tr. 186). (Whereupon said deposition of Edmund Ivens was received in evidence, said deposition reading as follows:)

Mr. Ivens testified that he is a mechanical engineer and has followed such occupation for twenty years; that he graduated from Tulane University in New Orleans with the degrees of B. E. and M. E. and has followed his profession since graduation.

Direct Examination.

(By Mr. CALLAN.)

Q. Will you please mention some of the engineering projects with which you have been associated or identified?

A. Design, installation and tests of power plants of every [193] description practically, with the exception of water power plants.

Q. Will you please mention some of the projects with which you have been connected?

A. The following power plants: Joseph Rathbone Lumber Company; Louisiana Cypress Lumber Company; Eastman, Gardiner & Company; Jackson Public Service Corporation; Central Light & Power Company.

The following municipal plants: City of Natchez, Mississippi; City of Leland, Mississippi;

(Deposition of Edmund M. Ivens.)

Greenwood, Mississippi; Hattiesburg, Mississippi; Homer, Louisiana; Franklin, Louisiana.

The following air lift work; Crowley Oil & Mineral Company; Jennings-Haywood Oil Syndicate; Marmou Power Company, and possibly fifty or seventy-five others in both power plants, air lift and hydraulic work.

Q. Now, will you please state the nature of the work which you did for the electric light and power companies?

A. Design, installation and tests of complete and partial power plants, including light and water systems.

Q. Will you please define what you mean by the term "air lift"?

A. Elevating and transmitting of liquids, semi-liquids and solids through horizontal or vertical pipes is in general known as the "air lift system," when employing compressed air as a pumping medium.

Q. Please state whether or not the air lift is limited to liquids alone. [194]

A. It is not limited to liquids alone.

Q. What does the term "air lift" refer to as applied to this territory?

A. In this territory it refers principally to the elevating and transmitting of water and oil in deep wells.

Q. Will you state whether or not it is also used in the extraction of sulphur?

Mr. WUPPER.—Objected to as leading.

(Deposition of Edmund M. Ivens.)

A. It is no longer used in this territory for elevating sulphur. It was formerly used by the Union Sulphur Company at Sulphur, Louisiana, as a pumping means, but the operations have ceased in this field.

Mr. CALLAN.—Q. State whether there is any difference in conveying materials whether semi-liquids, or liquid, by air.

A. The principle is the same.

Q. Do you represent or have you represented companies dealing in compressed air machinery?

A. I represented for eighteen years the Ingersoll-Rand Company, and, for the past two years, I have represented the Chicago Pneumatic Tool Company.

Q. Please state whether you have given any particular study to the history of the air lift in conveying material by compressed air.

Mr. WUPPER.—Objected to as leading.

A. I have given a great deal of study to the subject, as well as being practically engaged in the installation of air lift plants.

Mr. CALLAN.—Q. Have you published any books or pamphlets on the subject? [195]

A. Yes.

Q. Will you please state what those books and pamphlets are, the titles and the dates of publication?

A. One book entitled "Pumping by Compressed Air," published by John Wiley & Sons of New

(Deposition of Edmund M. Ivens.)

York City in 1914; and a second edition of this book in, I believe, 1922.

The following articles: "Tests Upon Compressed Air Pumping Systems for Oil Wells," published, I believe, in 1909 in The Transactions of the American Society of Mechanical Engineers.

"Air Lift Efficiency," published in "Power," the date of which I don't recall.

There have been, in addition to those, possibly four or five articles on this subject and kindred subjects published from time to time in "Power."

Q. For what purpose did you write the book "Pumping by Compressed Air"?

A. Principally as a text-book for students and reference book for engineers.

Q. Has it been so used?

A. It has. It is being used as reference in the British Army Manual of the Engineering Corps.

Q. Will you please briefly detail the history of the air lift in conveying material by compressed air?

A. The first written record we have of the air lift, I believe, is found in the Book of Heron, which describes an air lift system used in the mines of Chemnitz, Hungary; the date, I believe, was some time in the middle of the eighteenth century. In the latter part of the eighteenth century, about 1790, a German engineer by the name of [196] Loscher performed some experiments with the air lift. Since that time, there have been issued by the Government for a number of systems.

(Deposition of Edmund M. Ivens.)

Mr. WUPPER.—The answer is objected to as obviously hearsay and incompetent.

Mr. CALLAN.—Q. Will you please state some of the uses of air lift, which you have observed in reading and experience on the subject?

Mr. WUPPER.—The question is objected to as incompetent, so far as it relates to what the witness encountered in his reading.

A. Elevating and transmitting of liquids, such as water and oil, semi-liquids and solids.

Mr. CALLAN.—Q. Will you please state what theories are recognized in the engineering profession in reference to air lift work?

Mr. WUPPER.—The same objection.

A. There are two well-known theories, namely, Saunders or Pohle and Frizell.

Mr. CALLAN.—Q. Please explain the Saunders and Pohle theory.

A. The Pohle and Saunders system or theory consists of a piston-like layer formation of liquid and air; and the Frizell system or theory consists of an aeration or bubble principle of admitting the pumping medium or compressed air.

Q. Will you please state the comparative times when these theories made their appearance?

A. The Pohle, I believe, made its appearance about 1880, and the Saunders about 1898. [197]

Mr. WUPPER.—Objected to as incompetent.

Mr. CALLAN.—Q. When did the Frizell theory make its appearance?

A. I don't recall that without looking it up.

(Deposition of Edmund M. Ivens.)

Q. Is that date shown in your book?

A. I believe it is.

Q. Would you kindly refer to your book, Mr. Ivans, "Pumping by Compressed Air," and state whether the date is shown in that book?

(Witness examines the book.)

A. On page 88 of my book, there is a record of patent granted to J. P. Frizell, No. 233,499, and granted in 1880.

Mr. WUPPER.—Objected to as secondary and incompetent.

Mr. CALLAN.—Q. Was the Pohle system patented?

A. The Pohle system was patented.

Q. Could you give the date and number of the patent?

A. The date 1882, patent No. 487,639. (Witness examining book.)

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. Is the Frizell principle illustration or described in your work, Mr. Ivens?

A. The Frizell principle is illustrated and described on pages 88 and 89 of my book.

Q. And the Pohle principle, is that illustrated in your work?

A. The Pohle system is illustrated and described on pages 90, 91 and 92 of the same book.

Q. How are the illustrations designated?

A. The Frizell is designated on page 88 by Figure 35, and the Pohle on page 91 by Figure 36. [198]

(Deposition of Edmund M. Ivens.)

Mr. WUPPER.—The same objection: the book itself is the best evidence of its contents.

Mr. CALLAN.—Q. Is the Saunders principle illustrated in your book?

A. The Saunders principle is illustrated and described on pages 93, 94 and 95.

Q. Is the patent number shown in your book?

A. The patent number is not shown.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Will you please detail, Mr. Ivens, more minutely the Frizell and Pohle theories of operation of air lifts and what influence these theories have had on air lift development?

Mr. WUPPER.—The testimony is objected to as incompetent, unless the witness testifies that he is speaking from experience with this apparatus.

A. The Pohle system, as applied to well work, consists of a discharge line or eduction pipe inserted in the well casing. Between the well casing and the discharge pipe is hung an air pipe, the bottom of which is turned upward and inside of the discharge line. The ends of both discharge line and air line are submerged a given distance below the water level. Operation is as follows: Compressed air is forced inside of the small air line and released through the return bend inside of the discharge line. Air is admitted in a piston formation with the water, and these piston-like layers lighten the column inside of the discharge pipe to such an extent that the hydrostatic pressure outside of the dis-

charge line overbalances that inside and a flow is created [199] at the well top. The air pistons, on leaving the return bend, gradually increase in size as they approach the well top, due to elasticity of the air and reduced pressure.

The Saunders system operates on the same principle, that, a formation of piston-like layers of air and water; the difference being, however, that the space between the discharge line and the well casing is used to convey the air to the bottom of the discharge line, and no auxiliary air line or return bend is employed.

The Frizell system or principle consists in finally dividing the air volume into small bubbles or globules by using a foot-piece at the bottom of the discharge line for this purpose, and thereby lightening the column through an aeration principle rather than a piston-like formation principle.

Mr. CALLAN.—Q. In the Saunders system how is the air chamber created specifically?

A. The air chamber is bounded by the discharge line in the center, the well casing surrounding the discharge line, a flange at the well top, and the water level in the well.

Q. Is the well open or closed at the top?

A. Sealed.

Q. Is that construction shown in Figure 37 on page 93 of your book, Mr. Ivens?

Mr. WUPPER.—Objected to as secondary and incompetent.

(Deposition of Edmund M. Ivens.)

A. The sealing flange is shown by "F" prime in Figure 37, page 93 of my book.

Mr. CALLAN.—Q. Is the discharge pipe marked in the diagram in your book? [200]

Mr. WUPPER.—The same objection.

A. The discharge line is indicated by "D" prime.

Mr. CALLAN.—Q. Are the pistons illustrated?

Mr. WUPPER.—The same objection.

A. The pistons are shown by the alternate light and shaded areas.

Mr. CALLAN.—Q. Is the chamber which you have testified to shown in that diagram, and, if so, how is it designated?

A. The chamber is designated by the light space between the discharge line "D" prime and the well casing "E" prime—"C" prime.

Mr. WUPPER.—The same objection to the question and answer.

Mr. CALLAN.—Q. Can you give us its boundaries?

A. The boundaries are "f" prime, which is a flange; "E" prime—"C" prime, which is the well casing; "D" prime, which is the discharge line, and the line G–G which is the fluid level in the well.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. Where is the compressed air admitted into the chamber?

A. Compresed air is admitted through the small pipe designated by "F."

Mr. WUPPER.—The same objection.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. Have you ever installed any wells with such a construction?

A. Many of them.

Q. And with what result? [201]

A. The actual operation was reliable, but the efficiency not as good as other systems.

Q. Are those wells still in operation?

A. None that I know of.

Q. Have you ever equipped any wells employing the construction described in connection with the Pohle system, an apparatus such as is illustrated on page 91 of your book? A. Many of them.

Q. Now, when you did install such wells, how was your air let into the discharge pipe?

A. In the Pohle system, the air was admitted to the discharge line at or near the bottom with a small air pipe and a return bend pointing upward inside of the discharge pipe.

Q. Is such an air line illustrated in the book on page 91? A. It is.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. How is the air line marked in that diagram?

A. By small letter "a."

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. How does that pipe "a" extend in the well and deliver the air?

A. The pipe extends vertically downward between the discharge and the casing, terminating in the return bend referred to.

(Deposition of Edmund M. Ivens.)

Mr. WUPPER.—The same objection to the question and answer.

Mr. CALLAN.—Q. For what purpose have you used such construction?

A. For elevating water, oil and grains, vertically and horizontally. [202]

Q. Now, at page 108 of your book, there appears an illustration of an air lift construction. Please state what that is.

Mr. WUPPER.—Objected to as calling for secondary evidence.

A. Figure 47 on page 108 illustrates what is known as a combined Pohle and central pipe perforated end system. The idea of this double system is to obtain a reduction in the starting pressure of a well whose difference in static and dynamic heads is great. The well is started by opening valve "B" shown at the well top and closing valve "A." This admits air to the central system and the first head is blown off, thereby increasing the pumping head. When pressure is sufficiently reduced, valve "B" is closed and valve "A" is opened, and the operation begins and continues through this longer air line. The system is used extensively in oil well pumping where the heads are great and the pressures are high.

Mr. WUPPER.—That portion of the answer describing the illustration of the book is objected to as secondary.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. How is the starting line marked?

A. The starting line is attached to valve "B."

Q. And is indicated by what lettering?

Mr. WUPPER.—The same objection.

A. Indicated by letter H-1.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. And the valve, I understand, is identified by what letter?

Mr. WUPPER.—The same objection.

A. The letter "B." [203]

Mr. CALLAN.—Q. And that valve is in the short line which terminates at the lower end of line H-1; is that correct?

A. That's correct.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. The long line is indicated by what marking, Mr. Ivens?

A. The long line is attached to valve "A" and is indicated in length by "H."

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. Is there a discharge pipe shown on that diagram?

A. There is.

Mr. WUPPER.—The same objection.

Mr. CALLAN.—Q. How is the upper terminus or discharge indicated?

A. Indicated by an elbow.

Mr. WUPPER.—The same objection.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. And the discharge is in that elbow?

A. The discharge is swung from the elbow.

Mr. WUPPER.—The same objection.

A. (Continuing.) This elbow referred to is the largest shown.

Mr. CALLAN.—Q. Is the line "A" inside or outside of the discharge line?

A. Line "A" is outside of the discharge line.

Mr. WUPPER.—The same objection.

Mr. CALLAN—Q. Is line "a" with the upward return bend at the bottom, like or unlike the line "a" that you described in connection with [204] the Pohle system on page 91?

A. It is like line "a."

Mr. WUPPER.—Objected to as calling for the opinion of the witness and as being not the best evidence.

Mr. CALLAN—Q. Will you turn to page 97 of your book, Mr. Ivens, and tell us what the diagram on that page has reference to?

A. Figure 41, page 97, has reference to the Harris theory.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. Do you know the full name of Mr. Harris?

A. Professor Elmo G. Harris.

Q. Do you know with what institutions he is presently connected or has been connected in the past?

(Deposition of Edmund M. Ivens.)

A. He has been or is connected with Columbia University or the University of Missouri.

Q. What is his reputation and standing in the profession in so far as compressed air work is concerned?

A. Professor Harris is considered an authority on compressed air work.

Q. Will you please turn to page 109 of your work, Mr. Ivens, and state briefly what was intended to be illustrated there?

A. Figure 48, page 109, is intended to illustrate a stage system of air lifts which is employed where the submergence would be insufficient if a single lift were employed.

Mr. WUPPER.—Objected to as not the best evidence.

Mr. CALLAN.—Q. Please state what you mean by submergence and its significance [205] in this work?

A. By "submergence" is meant, as the term indicates, the insertion of the air and discharge lines beneath the water level. This submergence is necessary in order that the air lift may be operated, and is referred to either in feet or in percentage. When referred to in feet, it means the distance below the water level that the air is admitted into the discharge pipe, and when referred to in percentage, it means this distance in feet divided by the total length of vertical air or discharge line.

(Deposition of Edmund M. Ivens.)

Q. Now, at page 152 of your book, there appears an illustration of an air lift construction. Will you please describe that with particular regard to your actual experience with such a system?

A. Figure 77 on page 152 illustrates the Harris system as manufactured by the Harris Air Pump Company of Indianapolis, Indiana.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. Go on and describe the system, Mr. Ivens.

A. This Harris system consists of an air line between discharge line and well casing, a foot-piece and a well top with connections. The foot-piece operates on the principle of an ejector, and there is provided within the foot-piece a *venturi* contraction. The air line has a return bend and admits air into the foot-piece in small finally divided globules.

The well top consists of a sealed flange and an auxiliary air line which admits compressed air at reduced [206] pressure between the discharge line and the well casing, thereby forming a cushion on top of the water level and between the flange and water level. This cushion compensates in a way for reduced submergence, and, at the same time, prevents the formation of a vacuum or partial vacuum between the well top and the fluid level.

The main operation of the system is accomplished by forcing compressed air through the outside air line into the foot-piece, the auxiliary air line simply acting to prevent vacuum and also prevent surging,

(Deposition of Edmund M. Ivens.)

and compensate, as stated, in a way for reduced submergence.

Q. Specifically how did it compensate for the reduced submergence?

A. By forming a pressure or cushion on top of the fluid level.

Q. Now, will you please explain what you mean by the term "reduced submergence"?

A. Submergence is reduced by the falling of the static head, and, in the event that this should be excessive, there would be loss due to slippage.

Q. What do you mean by the term "static head"?

A. Static head, when applied to deep wells, is the distance below the ground level that the water stands when the well is idle, or, in other words, the standing level.

Q. And what is meant by the term "dynamic head"?

A. By "dynamic head," that is the distance below the ground that the water stands when the well is in operation, in other words, the moving head.

Q. Now, I show you, Mr. Ivens, a pencil sketch which I will mark "New Orleans Exhibit No. 9," and ask you who [207] made that sketch?

A. I prepared the original of which this is a carbon.

Q. Was the original offered in evidence in the matter entitled "Concrete Mixing & Conveying Company, Plaintiff, vs. Great Western Power Company of California, Defendant"?

(Deposition of Edmund M. Ivens.)

A. I made the sketch; I can't say from my own knowledge just what was done with it.

Q. What is that sketch?

A. The sketch is intended to illustrate roughly the Harris system of pumping.

Mr. CALLAN.—We offer in evidence the sketch identified by the witness, marking same as "Defendant's New Orleans Exhibit No. 9."

Mr. WUPPER.—The exhibit is objected to as immaterial, irrelevant, and incompetent, and as being so faint and indistinct as to make the apparatus which it purports to represent indistinguishable and illegible.

Mr. CALLAN.—Q. Now, will you compare the operation shown in this Defendant's New Orleans Exhibit No. 9 with the operation shown in the Saunders method, Figure 37, page 93 of your book, and Figure 36 at page 89, illustrating the Pohle air lift?

A. The system illustrated by the sketch resembles the Saunders system in that the auxiliary air line designated by "B" admits compressed air into the air chamber between the discharge line and the casing.

The system shown by the sketch resembles the Pohle system in that compressed air is admitted into a small air line designated by "a" and admits air, through a return [208] bend into the foot-piece.

Q. What are the differences in the Harris system as compared with the Pohle and Saunders systems?

(Deposition of Edmund M. Ivens.)

A. The difference is that the resemblance to the Saunders system does not act to actually pump the fluid. The air chamber in this case simply provides space for a cushion of air.

The actual pumping done by the Harris system is done in a manner somewhat similar to the Pohle system the difference being the addition of the foot piece and the finally dividing of the air volume into small globules, whereas the Pohle system operates on the piston-like layer formation.

Q. What similarities and dissimilarities exist between the systems mentioned, in regard to the construction of the systems?

A. The Pohle and Saunders systems are simply made up with pipe and fittings. The Harris system is made up of a bronze or brass foot-piece of refined design, to go with a specially designed well top.

Q. Now, will you please state what the letter "F" on Defendant's New Orleans Exhibit No. 9 indicates?

A. The letter "F" indicates the auxiliary air line, and this air line terminates in the flange at the well top.

Q. Will you please state what the small "a" on Defendant's New Orleans Exhibit No. 9 indicates?

A. The small "a" indicates the main air line which terminates in the return bend at the foot-piece.

Q. Does or does not that line correspond with the

(Deposition of Edmund M. Ivens.)

air line "a" of the Pohle structure at page 91 of your book? [209]

A. It is the corresponding pipe.

Q. How does the Saunders method compare in efficiency with the other methods?

A. The Saunders system is not as efficient as other and later methods.

Q. Now, will you please compare the Saunders structure and operation of admitting air in pipe "F" with the Harris method in Defendant's New Orleans Exhibit No. 9?

A. The method of admission of air in both cases is identical.

Q. Which is the more efficient, the Harris or the Saunders? A. The Harris.

Q. And the reason for the greater efficiency is what, in your opinion?

A. The reason for the greater efficiency is that, in the Harris system, the air volume is broken up into small bubbles and globules, and it has been proven that where the air volume is broken up into these small bubbles, the loss by slippage is less, and the smaller the globules or bubbles the less the slippage loss. Experiment and calculations have proven that the air slippage loss varies as the square of the volume of the air bubble; therefore, it is advantageous to reduce the size of the air bubbles as much as practicable.

Mr. WUPPER.—Objected to as incompetent and secondary.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Now, please compare the Harris method, as shown on Defendant's New Orleans Exhibit No. 9, with the method shown on Figure 47 of your book at page 108.

A. The only similarity between the Harris method and the system shown in Figure 47 at page 108 is that the actual [210] pumping is done by forcing compressed air down through the air line suspended between the casing and the discharge and terminating in a return bend.

Q. What is the Figure 47 designed to represent?

A. Figure 47 represents, as before stated, a system employed where there is a great difference between the static and dynamic heads, making the starting pressure excessive, in the event that the system were designed with proper submergence to take care of a heavy dynamic head. The operation of the inside line is for starting only, and the actual pumping is done by the outside line.

Mr. WUPPER.—Objected to as not the best evidence.

Mr. CALLAN.—Q. How does the Harris system compare, as to its operation on that reduced submergence, with other systems?

A. The Harris system is able to operate efficiently on a lower percentage of submergence due to the fact that a reduced submergence is compensated for in a way by the cushion of air which is provided in the air chamber by the auxiliary air line.

(Deposition of Edmund M. Ivens.)

Q. In general, what is the idea of a submergence?

A. The idea of submergence is to enable an air lift to operate, without submergence, the lift would be inoperative.

Q. And what effect has an increase of submergence on the operation of the system?

A. Increased submergence means increased operating pressure and decreased air slippage.

Q. And conversely a decrease of submergence means what? [211]

A. Reduced pressure and increase air slippage, so that it is necessary, in designing an air lift, to experiment and determine the most efficient point, and this point being that at which the sum of the two evils is least.

Q. In the Harris system, how do you compensate for the decreased submergence that you may meet with?

A. By putting a pressure on top of the fluid level in the air chamber.

Q. And it is to accomplish this that air is admitted through pipe "F"?

Mr. WUPPER.—Objected to as leading.

A. It is to accomplish this as well as prevent surging and the possibility of creating a vacuum. By creating a vacuum at this point would mean that the well was operating against itself.

Mr. CALLAN.—Q. Now, in submergence, what general rule or ratio applies between the depth of

(Deposition of Edmund M. Ivens.)

water or an amount of submergence and pounds pressure in different liquids?

A. It all depends on the pumping head and the actual conditions existing in the individual wells. For water wells, the percentage of submergence in this territory will seldom exceed seventy per cent.

Q. Express in terms, if you can, the ratio as to water. Say one hundred feet of submergence, or a head of one hundred feet of water, gives you what pressure at the bottom?

A. One hundred foot static head will create 43.4 pounds pressure. In other words, .434 pounds pressure equals one foot in head. [212]

Q. If you had two hundred foot head, what is the pressure at the bottom approximately?

A. 86.8 for static conditions. For dynamic conditions, it is necessary to make a correction for the velocity head.

Q. Have you seen wells in operation where the air lift is employed for either water or oil or anything else? A. Both.

Q. What is the deepest well where the submergence principle was used entirely in regard to water?

A. Water submergence in wells, I have seen as deep as six to seven hundred feet, and in oil wells as high as twelve hundred feet or approximately twelve hundred feet.

Q. And approximately what pressure in pounds would that give you at the bottom when the air line is let in?

(Deposition of Edmund M. Ivens.)

A. The water wells with the submergence stated, approximately two hundred and fifty pounds, and in oil wells approximately four hundred and fifty pounds. These pressures include the natural correction for velocity head.

Q. And in terms of percentage, what is that?

A. In terms of percentage, the water wells will range from forty per cent submergence to seventy per cent, and oil wells from fifteen to thirty per cent.

Q. What is the deepest well on the submergence plan that you have known in regard to oil wells?

A. The actual depths of the well run approximately two thousand feet in oil wells. There is a difference, however, between actual depth of well and depth of submergence.

Q. Have you employed the Harris method, as delineated on the sketch marked Defendant's New Orleans Exhibit No. 9, in air pumping? [213]

A. I have.

Q. And what kind of wells and to what depths?

A. In water wells and oil wells; the depths of water wells ranging from probably two hundred and fifty feet to possibly fifteen or eighteen hundred feet; in oil wells ranging from two thousand to three thousand feet. These figures are actual depths of well and do not refer to submergence.

Q. But where you are pumping with the two thousand foot oil well, what air pressure do you admit to one line or the other in the Harris method, that is, the line "F" or air line "a"?

(Deposition of Edmund M. Ivens.)

A. Two thousand foot oil wells may have static heads ranging from flowing wells or gushers to pumpers whose heads may be down seventeen hundred feet. Consequently the air pressure would vary from zero to six hundred pounds pressure, depending on the well.

Q. Now, would that be in line "a" or in line "F"?

A. That would be in line "a."

Q. And how many pounds pressure in line "F" under similar conditions?

A. That would also fluctuate, for in gushers there is no air lift used. In deep well pumpers, this pressure may run as high as one hundred to one hundred and fifty pounds.

Q. Now, in water wells, what is the approximate pressure in line "a" and line "F" on an average water well?

A. Water wells will vary as widely as oil wells, but I should say with a pressure of one hundred and fifty pounds in line "a," it might be found necessary to provide [214] as high as seventy-five pounds in line "F."

Q. Now, referring to the Harris method, Defendant's New Orleans Exhibit No. 9, assuming the structure was turned to an arc of ninety degrees, so that the receptacles and piping all lay horizontal, what would be the operation then?

Mr. WUPPER.—Objected to as calling for an opinion or conclusion of the witness, not based upon

(Deposition of Edmund M. Ivens.)

any questions or answers showing actual experience with the type of apparatus.

A. In the event that a supply of liquid was made available and the well properly sealed and piping properly installed, which is to be assumed, the operation would take place in like manner as if in a vertical position.

Mr. CALLAN.—Q. And your answer is based upon the fact that the air would continue to be admitted in "F" and also "a"?

Mr. WUPPER.—Objected to as leading.

A. Yes, it would be almost necessary to provide a continuous supply of pumping medium.

Mr. WUPPER.—The answer is objected to as the opinion of the witness, and not based upon any experience or facts brought out by the previous questions and answers.

Mr. CALLAN.—Q. Please tell us in detail what you mean by the term "slippage"?

A. By "slippage" is meant the passing by of air globules through the water column without doing effective work.

Q. What is meant by the term "velocity"?

A. By "velocity" is meant the feet per second of travel, [215] and in this case of the travel of the air and water in the discharge line.

Q. Now, what is the velocity of the average air lift at the well top?

A. Variable, ranging somewhere between ten or twelve to twenty-five feet per second.

(Deposition of Edmund M. Ivens.)

Q. And with that range of twelve to twenty-five feet per second at the well top, what would it be at the lower end of the discharge pipe?

A. That would also be variable, and would depend upon well conditions. A statement of figure would be simply a guess.

Q. In respect to the top or the lower end of the discharge, is the velocity greater or less?

A. Velocity is greater at the top than at the bottom, the difference depending upon pressure, length of line, pumping head and other variables.

Q. And generally, why is there this difference in the velocity?

A. Because of the expansion of the air volume from the bottom to the top, and which is due to reduced pressure or resistance. The gradual expanding of the air increases the volume, and volume increase means velocity increase.

Q. The subject of velocity is covered in your book, is it not, Mr. Ivens?

A. It is treated.

Mr. WUPPER.—Objected to as secondary.

Mr. CALLAN.—Q. Have you any reason to revise or correct any of the [216] statements you have made in regard to this subject.

A. No.

Q. On page 137 of your book, Mr. Ivens, you refer to a test of the Saunders system made "by the writer on oil Well No. 32 of Crowley Oil & Mineral Compay, Evangeline, Louisiana, and the results published in the proceedings of the Ameri-

(Deposition of Edmund M. Ivens.)

can Society of Mechanical Engineers, Volume 31, page 311." Will you just briefly tell about that work and what the operation was?

A. The idea of the test referred to was to determine which of two systems of air lift pumping was the more efficient. Tests were run on the Saunders system and the data compiled after making observations of the performance of the well, determining the water horse-power and also indicating the air compression and determining the indicated horsepower.

The Saunders system was then replaced by the Harris system and similar tests were made, data compiled and results compared.

Mr. WUPPER.—The answer is objected to as hearsay, and it not appearing from the witness' testimony that he participated in those tests.

Mr. CALLAN.—Q. Who conducted the tests?

A. I did.

Q. And who made the compilation? A. I did.

Q. On page 139 appear certain figures as to depth of well, diameter of discharge pipe, operating air pressure, etc. Will you please state what those figures [217] represent?

A. Those figures represent conditions existing in the well, together with such data and observations as made during the tests, and compilations thereafter.

Q. Have you published results of operations with the Harris method? A. Yes.

Q. In what publication?

(Deposition of Edmund M. Ivens.)

A. In the Transactions of the American Society of Mechanical Engineers, Volume of 1909, pages 326 to 329, this being a tabulation of the observations taken during tests of oil wells. The entire article begins on page 311 and ends on page 329.

Q. That article was entirely written and prepared by you, Mr. Ivens? A. It was.

Q. It was published at your direction?

A. It was published from my manuscript.

Q. And the date? A. 1909.

Q. That is the same article concerning which you testified in the case entitled "Concrete Mixing & Conveying Company, Plaintiff, vs. Great Western Power Company of California," in Equity, No. 1804, of the docket of the United States District Court for the Northern District of California, Southern Division?

Mr. WUPPER.—Objected to as leading.

A. It is.

Mr. CALLAN.—In connection with the testimony of the witness we offer and introduce the article to which we mark for [218] identification Defendant's New Orleans Exhibit No. 10.

Mr. WUPPER.—The exhibit is objected to as immaterial and incompetent.

Mr. CALLAN.—To what extent is the system of pumping by compressed air used, both in this region and elsewhere?

A. Very largely used in such industries as ice plants, waterworks, plants, electric light plants, sawmills, sugar factories, oil refineries, hotels, of-

(Deposition of Edmund M. Ivens.)

fice buildings, and in almost every industry located inland where surface waters are not available.

Q. Now, with particular reference to this locality?

A. In this locality, air lift is used in elevating water, oil, sulphur, and, in some instances, solids like grain.

Q. You mentioned sulphur. You have also testified, I believe, Mr. Ivens, that air lifts are no longer employed in mining sulphur. Was this method formerly utilized in mining sulphur?

A. By not being used in mining sulphur, I had reference to this territory and the particular installation at Sulphur, Louisiana. Air lift is still used in mining sulphur at the plant of the Freeport Texas Sulphur Company and the Texas Gulf Sulphur Company.

Q. What effect had the discovery of the Mr. Herman Frasch referred to in your article upon the sulphur industry?

A. The Frasch system of pumping sulphur made it possible to mine sulphur without the use of a large shaft; therefore, making available enormous sulphur domes for exploitation.

Mr. WUPPER.—Objected to as incompetent and immaterial. [219]

Mr. CALLAN.—Q. Now, on page 147, of your book, you refer to certain special applications. Tell us what knowledge you have of the various instances you mentioned?

A. The knowledge I have of those special applications is detailed on pages 147 to and including 149.

(Deposition of Edmund M. Ivens.)

The first application is an air lift for mine drainage and is nothing more or less than an air lift, and this is illustrated in Figure 72.

Figure 73 is also a simple air lift for conveying grains, with the addition of a horizontal piping system inserted into the elbow.

The system illustrated in Figure 74 is sulphur mining, and consists of a simple air lift with the added melting medium of super-heated water.

Mr. WUPPER.—Objected to on the ground that it is secondary and not the best evidence.

Mr. CALLAN.—Q. Is the air lift employed in the discharge of sewage?

Mr. WUPPER.—Objected to as leading.

A. The displacement pump is used in handling sewage.

Mr. CALLAN.—Q. And what is that?

A. The displacement pump consists of a cylinder or chamber wherein a supply of the liquid is allowed to collect. Compressed air is then forced on top of the sewage and the chamber emptied. The valve mechanism is so arranged that sewage is first admitted, a charge of air next admitted, and, after emptying the sewage, the air volume is cut off and the compressed air exhausted to [220] the atmosphere.

Q. Have you seen wells pump sand by air?

Mr. WUPPER.—Objected to as leading.

A. Nearly all wells in this locality pump sand.

Mr. CALLAN.—Q. What has been your experience in that?

(Deposition of Edmund M. Ivens.)

A. The wells in this locality are drilled into sand strata and receive their supply of water from them. A strainer is placed in the well to prevent the admission of sand, but these strainers are not entirely effective as quantities of sand find their way through the perforations and are pumped out with the water.

Q. What is the nature of the flow that you have observed?

A. In a free-flowing well, properly designed piping and sufficient and not over-sufficient supply of air, the discharge is fairly steady. In wells where the air supply is insufficient, or there is an oversupply due to an attempt at forcing, or the air lift itself is improperly designed, there is an intermittent flow known as "heading."

Q. Now, why does an insufficient air volume cause this intermittent flow?

A. An insufficient air volume causes an intermittent flow due to the fact that the volume, on entering the discharge line, immediately creates in the system a reduction in air pressure and this reduction in air pressure must be built up before the system can become operative. This occurs in regular cycles or intervals, causing a flow of first air and then water.

Q. And how has it been when you observed sand or gravel being pumped? [221]

Mr. WUPPER.—Objected to as leading; the witness has not previously testified that gravel has been pumped by compressed air.

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. Have you ever observed sand or gravel being pumped with water?

A. I have.

Q. State what difference there would be in the operation as previously described by you, in the case of sand and gravel.

A. There would be no difference in the actual operation of the air lift.

Q. When you have sand and gravel coming out of water, what is the appearance at that time of the discharge column?

A. That will depend upon the position of the discharge line. In the event that it is vertical, there will be a more or less even flow. In the event of a long horizontal line, there would be a tendency, due to difference in specific gravity, of the air riding the fluid; so that the appearance at the discharge end would be of a horizontal flow of air, and an arc of fluid.

Q. Is the line of demarcation between the air and fluid substance apparent to the eye? A. It is.

Q. Now in your testimony given in the Great Western Power Company case, previously referred to, there was exhibited to you a series of small pictures. Do you recall those pictures, Mr. Ivens?

A. I do. [222]

Q. Were those pictures identified by you in connection with the operation which you have just described.

(Deposition of Edmund M. Ivens.)

A. I can't say that they were identified, but there appeared to be a typical air lift discharge from a horizontal pipe-line. Only the end of the pipe was shown, and it was impossible for me to say just where this pipe came from.

Mr. WUPPER.—Objected to as irrelevant and incompetent.

Mr. CALLAN.—In connection with the testimony of the witness, we offer those pictures, which are now in evidence as New Orleans Defendant's Exhibit No. 11 in the case of Concrete Mixing & Conveying Company vs. Great Western Power Company of California, No. 1804 of the docket of the United States District Court in and for the Northern District of California, Southern Division.

In connection with the testimony of the witness, we offer in evidence Mr. Ivens' book entitled "Pumping by Compressed Air, Ivens 1914, marked Defendant's New Orleans Exhibit No. 12, and already offered in evidence in the case entitled Concrete Mixing & Conveying Company vs. Great Western Power Company of California, No. 1804 of the docket of the United States District Court in and for the Northern District of California, Southern Division.

Mr. WUPPER.—The exhibits are objected to as irrelevant and immaterial; and the exhibit showing the pictures of the discharge, in addition, is objected to as not properly identified as to the location of the original and as representing a condition which was seen or observed by the witness. [223]

(Deposition of Edmund M. Ivens.)

Mr. CALLAN.—Q. The book offered in the case above mentioned, Mr. Ivens, is the same identical book from which you are now testifying?

A. I have only written one book, and it is the only book I know of by the title "Pumping by Compressed Air," and my recollection is that this book was offered in the previous case as an exhibit.

Cross-examination.

(By Mr. WUPPER.)

Q. Mr. Ivens, you stated that you had two editions of the book, "Defendant's New Orleans Exhibit No. 12." Are these two editions identical in so far as the matter referred to in your testimony is concerned, and as to the figure numberings and page arrangements and numberings?

A. I believe they are. I don't recall any changes other than additions at the back end of the book in the shape of actual installations and photographs and some mistakes in the mathematical formulae which were corrected.

Q. Where sand came up from the well with the water or oil, how was the sand separated from the water or oil?

A. Pumped into a surface reservoir, and the heavier fluid or the sand settled to the bottom and the toppings pumped into storage tanks or systems, depending on whether the fluid handled was oil or water.

Q. What is the largest percentage of sand pumped

(Deposition of Edmund M. Ivens.)

with either water or oil from a well within your knowledge.

A. The largest percentage of sand pumped with fluid was in oil wells, and, of course, there is a wide variation. [224] I have seen possibly as high as eighty to ninety per cent sand handled in fluids.

Q. You mean to say that eighty per cent of the discharge from the pump was sand?

A. From the air lift. This, of course, is a very abnormal condition and happens when strainers break and sand from the strata has no resistance into the well casing.

Q. Is it not true that, in your testimony given on or about May 30, 1927, in the case of Concrete Mixing & Conveying Company, plaintiff, against Stone and Webster, Inc., defendant, pending in the United States District Court in and for the District of Massachusetts, in Equity No. 2747, that you testified that the largest percentage of sand that you ever saw was about forty per cent of the total fluid?

A. This referred to normal operation of oil wells.

Q. Then the pumping of sand is always undesirable? As far as your experience goes, that is not a desirable condition for the well?

A. It is undesirable, decidedly.

Mr. WUPPER.—Without waiving any objections previously made, I should like to ask the witness questions regarding his opinion as to the operation of the apparatus represented by Defendant's Exhibit New Orleans No. 9.

(Deposition of Edmund M. Ivens.)

Q. If this apparatus were placed in a horizontal position, with the discharge pipe horizontal throughout its entire length, and the fluid being pumped and the air pressures maintained as described with reference to this apparatus, would there be any object in forcing air under pressure into the line represented as "a"? [225]

A. If there were fluid pressure in the manner stated, there would be no necessity for any system of pumping whatever, as there would be a gravity flow.

Q. That's all. [226]

DEPOSITION OF PHILIP L. WILSON, FOR DEFENDANT.

PHILIP L. WILSON, witness for defendant whose deposition was taken at Miami, Florida, on Saturday, September 3, 1927.

My name is Philip L. Wilson. I live at 1722 Jefferson Avenue, Miami Beach, Florida. I am a civil engineer. I have followed the practice of civil engineer since 1899. I graduated from Washington and Lee University, Lexington, Virginia in 1899. I received the degree of Civil Engineer from that University.

Prior to 1904 I was with the Ohio River Railroad, which is a branch of the B. & O. Then was with the Western Maryland for a few months, then with the New York Central & Hudson River Railroad for two years, then with the Southern Pacific, and came

(Deposition of Philip L. Wilson.)

to Florida in 1904. I was connected with the Florida East Coast Railway Company from 1904 to 1918. The lines of the Florida East Coast Railway Company are principally located between Jacksonville and Key West in the State of Florida.

During the years 1905 and 1906, I had charge of some of the dredges for the Florida East Coast Railway Company which were operated on the Florida Keys. My recollection is that the dredge "Manetto" was operated on Cross Key, "Babcock" and "Mikado" at Jewfish Creek. The "Rough Rider" was working on the opening between upper and lower Matecumbe, and dredges 1 and 2 between Lower Matecumbe and Long Key.

The object of the dredge work being done at that time was to make embankments or railroad fills. The nature of the material handled was marl, muck and roots, mostly.

The "Babcock" and "Rough Rider" were purchased by the Railway Company from a dredging concern in Georgia. I represented the East Coast at the time the purchase was made. These dredges were towed from Savannah to Miami and later on down the [227] Keys where they worked at various points. These dredges were purchased by the East Coast Railway Company in 1905.

The "Babcock" and "Rough Rider" are known as vacuum dredges. The first operation, the material to be moved is dug from the bottom of the ocean with a bucket and then deposited into a hopper. From this hopper there is a pipe-line to

(Deposition of Philip L. Wilson.)

a vertical cylinder about six feet in diameter and 12 feet high. This cylinder is filled with steam. Then water is injected into the cylinder, which condenses the steam and forms a vacuum. A valve is then opened and the material is sucked by the vacuum into the cylinder. This first valve is then closed and live steam under high pressure is let into the top of the cylinder. A second valve is opened and the material is pushed out by the pressure of the steam into a pipe-line which runs from the cylinder to the rear end of the dredge, thence through a connecting pipe-line to the fill or place where the material is to be deposited.

At Jewfish Creek the dredge "Babcock" handled peat, roots and small branches of trees. At Central Supply, which is the opening between Upper and Lower Matacumbe, the dredge "Rough Rider" handled marl with some shell. Marl is a decomposed coral rock of soft consistency grayish in color.

These dredges forced material through and out of the pipe-line for a distance of approximately 1,000 feet. The "Babcock" carried a fifteen-inch pipeline and the "Rough Rider" an eighteen-inch. The pipes were for the same purpose on each dredge. Both the inlet and outlet pipes were fifteen inches on the "Babcock" and the inlet and outlet pipes were eighteen inches in diameter on the "Rough Rider."

Marl makes a most excellent roadbed. In general appearance it has a grayish color. After it has hardened out [228] to a certain extent, it re-

(Deposition of Philip L. Wilson.)

sembles concrete or very hard stiff clay. The majority of the roalroad banks or fills of the Florida East Coast Railway Company were made on a very flat slope, and the action of waves rolling up and down on the slopes is comparable to the action if the fill had been made of hard soap. If marl is dug from the bottom of the ocean and deposited in the fill, it has a decided cementing quality but if it is broken up it will go into solution in water and remain in solution for several days.

The vacuum dredging machines which I have described breaks up the material somewhat, but not as much as a suction dredge would. Our original experiment showed that if we could move the marl from the bottom of the ocean into the fill without disturbing it at all, we would get a very much better road bed than if the material was broken up in transit, and the object in using the "Babcock" and "Rough Rider" was that the material could be conveyed through pipe-lines with less disturbance than any other type of machines that we knew of. Occasional pieces of rock and conch shells were conveyed with the marl.

Referring to the marl as dug up and deposited in the hopper, in each case of the "Babcock" and the "Rough Rider"—the marl is a soft mud and our object was to dig it up in big bucketfulls and deposit it in the hopper and thence transfer it to the fill without using very much water. I said these dredges were purchased in Savannah, Georgia in 1905. They were not new when we purchased them.

(Deposition of Philip L. Wilson.)

I was not familiar with them prior to that time. When purchased they were equipped as I have described, for the purposes indicated. My recollection is that we used these dredges as vacuum machines during the years 1905 and 1906 and as boom dredges from 1907 to 1918. The "Rough Rider" was sold to a firm in Cuba, and the "Babcock" is still in use by the Railway Company as a boom machine. [229]

The Florida Keys were visited by a hurricane in October, 1906, which made a very lasting impression on my mind, as one of our houseboats went to sea with quite a loss of life, and all of our floating equipment was more or less damaged. The hurricane occurred in October, 1906. I am positive that the dredges "Babcock" and "Rough Rider" were used prior to 1906. J. C. Meredith was my chief at that time. He is no longer living. Others beside myself who have knowledge of these machines which I have described are:

Ernest Cotton.
Capt. Warner.
R. J. Ring.

I am familiar with ordinary cement as it comes in sacks. [230]

Q. If you had cement mixed with marl in the way you describe, would that have varied the operation or changed the operation you had?

Mr. WUPPER.—Objected to as asking for speculative testimony and for the opinion of the witness who is not qualified as an expert.

(Deposition of Philip L. Wilson.)

A. I do not consider that cement would make ony difference one way or the other.

Q. Do you know whether any publicity was given to the work of the building of this line of the Florida East Coast Railway during the years you refer to?

A. Many magazines carried articles regarding the construction of the Key West extension.

Q. Was there any other line in Florida known as the "Key West Extension" of the Florida East Coast Railway than this line you are speaking of?

A. No.

Q. You testified on June 3, 1927, in the cases of Concrete Mixing & Conveying Company vs. Stone & Webster, Incorporated, and Concrete Mixing & Conveying Company vs. Great Western Power Company of California, did you not?

A. I do not recall the exact date but I have testified during the last six months.

Q. Since you gave that testimony and up to now have you or not seen and examined certain exhibits or photostatic copies of exhibits in the two cases referred to which I now hand you, to wit: Exhibits Nos. 21, 22, 24 and 25 known as New York Exhibits of those numbers as filed in evidence in those cases and Exhibits 121, 120 [231] and 125 and also Hussey Patent No. 497,427 and Hussey Patent No. 526,530. I have the papers just enumerated in my hand and now hand them to you and the question is whether or not you have seen these photostatic copies of said exhibits since the time you testified heretofore up to this morning?

(Deposition of Philip L. Wilson.)

Mr. WUPPER.—Objected to as leading, incompetent, irrelevant and impractical.

A. I have not seen these since I testified.

Q. I hand you, herewith, the photostatic copies referred to in my last question, being such copies of New York Exhibits Nos. 21, 22, 24 and 25 and of Hussey Patent No. 497,427, and of Hussey Patent No. 526,530, also of New York Exhibits Nos. 121, 120 and 125, and offer same in evidence as Exhibits 15–A, 15–B, 15–C, 15–F, 15–H, 15–I, 15–D, 15–E and 15–G, respectively, same being so marked and identified by the Notary.

Mr. WUPPER.—The exhibits are objected to on the ground that they are incompetent, irrelevant, immaterial and not proven as the original.

Q. Will you please turn now to Exhibit 21, being a copy of "The Railroad Gazette" for April 20, 1906, and look at pages 404 and 405 and read the portions thereof marked "a" and "b" and being Miami Exhibit 15–A.

Mr. WUPPER.—Objected to on the ground that it is secondary evidence.

A. I have read it.

Q. Will you kindly read those two excerpts out loud so that they may be in the record.

A. "A Dredge is at work there sucking up the peaty bottom [232] of the lake, which is dumped into a hopper and then forced through big pipes supported by pontoon bridges for a quarter of a mile to the point where an embankment for the railroad track across the lake is being built. The only

(Deposition of Philip L. Wilson.)

foundation the key offers at this point is mangrove roots. The sections of pipe resting on the pontoons have leather elbows to permit of flexibility. Rattling can be heard in the big pipe as the pieces of coral rock are forced through. Occasionally a large jagged piece of rock will tear through a leather joint and then the mud spurts.'"

Mr. WUPPER.—Objected to as incompetent, immaterial and irrelevant.

Q. Do you yourself recall any of the incidents referred to in the excerpt which you have just read?

A. I had charge of this particular work and the dredge referred to is the dredge "Babcock." The flexible joints were made of rubber instead of leather and only occasionally was there a piece of rock forced through the pipe.

Mr. WUPPER.—Objected to as incompetent, immaterial and irrelevant.

Q. With the differences which you have just detailed, do or not the excerpts which you have read actually state the facts as they occurred at that time and place?

A. They correspond to my recollection of the work at that time.

Q. I now ask you to look at copy of New York Exhibit No. 22 which is made Exhibit 15-B for your testimony, being a copy of "Engineering-Contracting" for October 16, 1907, [253] and look at page 227 and read the excerpt on that page marked "a."

(Deposition of Philip L. Wilson.)

Mr. WUPPER.—Objected to as incompetent, irrelevant and secondary.

A. "EMBANKMENTS IN WATER. The first long embankment to be started was that between Upper and Lower Matecumbe Keys—about two miles in length. A persistent attempt was here made to construct a high and at the same time narrow embankment by means of an hydraulic dredge. The ordinary process of forcing mud and water through a pipe to the joint of deposit being impracticable, the settling basin not being large enough, a combination dipper and hydraulic dredge was used. The material being taken from the bottom by means of the dipper, was dumped into a hopper in the hold of the machine, and at stated intervals was forced from this hopper by steam pressure, through a pipe in the place of deposit. This plan required much less water than the ordinary form of suction dredge, still so much was used of necessity, that the material was kept in a saturated condition."

Mr. WUPPER.—Objected as incompetent, irrelevant and secondary.

Q. What have you to say as to the facts detailed in the excerpt last read by you?

A. I have no recollection of a suction dredge being used at this point. The balance of the article is practically correct.

Q. Then do I understand that with the exception as to the suction dredge you could make the facts

(Deposition of Philip L. Wilson.)

stated in the [234] article as a part of your testimony or not?

Mr. WUPPER.—Objected to as leading.

A. Yes.

Q. Will you turn to the copy of New York Exhibit 24, being your Exhibit 15-C "The Railway Age," for April 19, 1907, and look at the illustration on page 632 as to coral rock and I will ask you first if, in your enginering experience, you are familiar with coral rock and know it when you see it?

A. I am familiar with it and I think I know it when I see it.

Q. From such knowledge and familiarity with coral rock can you or not identify the illustration of coral rock as given on said page 632 as a true illustration of coral rock? A. I cannot.

Q. Why not.

A. Because the picture is not large enough to see.

Q. Look at the illustration of the pontoons on page 633 and see if you can identify that.

Mr. WUPPER.—Objected to as indirectly calling for secondary evidence.

A. Pontoon lines resemble each other so much that I cannot identify the picture as being one of the pipe-lines that I had charge of.

Q. Is it or not a typical illustration of a pipe-line on a pontoon.

A. It is typical of the pontoon pipe-lines that we used on the Key West extension.

Q. Are you or not able to identify the illustration on [235] said page 633 as a photograph of the

(Deposition of Philip L. Wilson.)

identical pontoon in use by you and the Florida East Coast Railway Company on the Key West extension?

A. I can identify the pipe-line which is supported by timbers on page 633.

Q. You identify that pipe-line on page 633 as what?

A. As the discharge line of the dredge "Babcock" between Upper and Lower Matecumbe.

Q. Will you read the excerpt marked "b" on page 633.

Mr. WUPPER.—Objected to as calling for secondary evidence.

A. "The coral rock, of which a considerable portion of the roadbed is composed, makes an excellent foundation, and the same material crushed affords excellent ballast. As before stated, this crushed coral becomes as hard as rock after exposure."

Mr. WUPPER.—Objected to as incompetent, irrelevant, immaterial and not the best evidence.

Q. What have you to say as to the facts stated in the excerpt last read by you?

A. Coral rock makes an excellent roadbed but the crushed rock does not cement again and becomes as hard as the original piece.

Q. As I understand, you said that you identified the illustration on page 633 of this article under which the words are written "Key West Extension—A Filling of Pulverized Coral" as an illustration or photograph of the pipe on the "Babcock" dredge?

(Deposition of Philip L. Wilson.)

A. It is a discharge line of the dredge "Rough Rider' between Upper and Lower Matecumbe.

Q. Mr. Wilson, have you examined the copies of Hussey [236] Patents No. 497,427 and No. 526,-530? A. I have.

Q. State whether or not you know anything about those copies or what have you to say in regard to them or their relation to the dredges "Babcock" and "Rough Rider"?

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. L. Hussey No. 526,530 is similar to the plant on the dredges "Babcock" and "Rough Rider." No. 497,427 indicates that this plant is operated by compressed air, while the dredges "Babcock" and "Rough Rider" were operated by steam.

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. Please make examination of the copy of New York Exhibit No. 121 which is your Exhibit 15–D "Supplement to Engineering News, July 13, 1895" and look particularly at the illustrations and at the parts of the printed matter marked in pencil.

A. I have examined this.

Q. Referring to the illustrations shown on said copy of Exhibit 121 which is Miami Exhibit 15–D, *and* you or not identify any of said illustrations?

Mr. WUPPER.—Objected to as incompetent and immaterial.

A. I do not identify any of the illustrations shown here on this sheet.

(Deposition of Philip L. Wilson.)

Q. Does that answer apply to the photographic copy shown thereon as well as to the drawings?

A. The drawings are typical of the type of machines used [237] on the dredge "Babcock" and "Rough Rider."

Q. Was or not the same kind of machinery used on the "Babcock' and "Rough Rider" as shown by the drawings on the illustration on said Exhibit 15–D?

A. A similar plant was used on both of those dredges.

Q. And the photograph in the lower left-hand corner of the first page of said exhibit under which are printed the words "View of Dredge in Operation." State whether or not the appearance of that dredge as shown in the photograph is similar to the appearance of the dredges "Babcock" and "Rough Rider" or whether the illustration is large or full enough for you to so say.

A. The illustration is similar but not identical and is not a picture of either the dredge "Babcock" or "Rough Rider."

Mr. WUPPER.—Question and answer objected to as incompetent, irrelevant and immaterial.

Q. What have you to say with reference to the printed matter marked in pencil on said Exhibit 15–D as to the correctness of said statements and your concurrence therewith?

Mr. WUPPER.—Objected to as leading.

A. The descriptive matter on page 380, generally

(Deposition of Philip L. Wilson.)

speaking, is typical of the dredges "Babcock" and "Rough Rider."

Q. Will you kindly look at Exhibit 15–E, being a copy of New York Exhibit 120, "International Navigation Congress — 1902, Communication by John Bogart" and read the printed matter marked thereon in pencil. [238]

A. I have looked at it.

Q. What have you to say as to the statements made therein and your agreement with the facts of Mr. Bogart's or not?

A. The printed description on pages 10 and 11 is almost identical with the dimensions of the dredge "Rough Rider" with the exception that I do not recall that the dredge "Rough Rider" had any suction pipe cutter.

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. Will you kindly examine copy of New York Exhibit 125, being Miami Exhibit 15–G, "Discussion on Dredging Operations," and read the printed matter marked in pencil?

A. I have examined and read that article.

Q. What have you to say as to the accuracy of the statements just read on Exhibit 15–G and your personal knowledge as to same and your agreement or disagreement with such statements.

Mr. WUPPER.—Objected to as incompetent, it not having been shown that the witness is familiar with the operations described in said exhibit, and as being immaterial and irrelevant.

(Deposition of Philip L. Wilson.)

A. The description on page 492 and page 493 of the print used is almost identical with my recollection of the dredge "Babcock." I have no knowledge whatever of the work done at this point.

Mr. WUPPER.—Objected to as incompetent, it not having been shown that the witness is familiar with the operations described in said exhibit, and as being immaterial and irelevant. [239]

Q. The point to which you refer is Newburgh, New York, as shown by said exhibit?

A. It is.

Q. Do you know anyone who was engaged in the operations at Newburgh?

A. Captain Sam Ross told me that he was employed on this work.

Mr. WUPPER.—Objected to as hearsay.

By Mr. GILLESPIE.—That is all.

Cross-examination By BENJ. F. WUPPER, Esq., on Behalf of the Complainant.

By Mr. WUPPER.—Without waiving any objections previously made I would like to ask the witness one question regarding defendant's Miami Exhibit 15–G, an alleged copy of "The Railway Age," Vol XLIII, No. 16, at page 633 thereof. Referring to said page 633, is the marked portion of the reading matter thereof pertinent to the illustration at the upper left-hand portion of this sheet?

By Mr. GILLESPIE.—I desire to ask the witness one question which I inadvertently forgot before I said that the examination in chief was closed and the witness not having yet answered any ques-

(Deposition of Philip L. Wilson.)

tion on cross-examination, I now ask the witness this question on direct examination.

Q. (By Mr. GILLESPIE.) Will you kindly read into the record the quotations marked in pencil which you examined on Miami Exhibits 15–C, 15–D, 15–E, 15–F and 15–G? [240]

Mr. WUPPER.—Objection is made to this question on the ground that the direct examination had closed and the cross-examination had commenced.

A. This is exhibit 15–C, page. 630. "One of the most remarkable pieces of railroad building now in progress is the extension of the Florida East Coast Railroad from Miami to Key West, Fla. The whole extension under construction is 128.15 miles, or from Homestead, Fla., the present terminus, to Key West. The distance from Homestead 74 miles will be constructed on land, the rest of the route being over swamp and water, of which about 25 miles may be considered swamp and 23 miles water. Work is progressing over the 74 miles of land and over the swamp work and water as rapidly as possible, the principal difficulty tending to delay the work being the procuring of the materials for concrete viaducts.

"Up to this time about 40 miles of grading have been completed from Homestead. On the entire route 50 keys must be crossed. Some of these are of considerable size, that is, have an area of several square miles, but most of them are small and their area is expressed in square rods. The distance apart vary considerably, and the depth of

(Deposition of Philip L. Wilson.)

water varies likewise from a few inches to 30 feet, the average depth being about 6½ feet."

This is Exhibit 15–C, page 633:

"The coral rock, of which a considerable portion of the roadbed is composed, makes an excellent foundation, and the same material crushed affords excellent ballast. As before stated, this crushed coral becomes as hard as [241] rock after exposure."

This is Exhibit 15–C, page 634:

"The halftone engravings accompanying this article are reproduced from photographs taken recently and show the latest progress of the work. For the map we are indebted to Railway Maintenance and Structures."

This is Exhibit 15–D, page 380.

"In the Hussey dredge, the shore delivery of the material is an essential feature, but this feature is entirely independent of the dredging, the dredging apparatus, merely dumping the material into a hopper or receiver, from which a pipe leads to the pumping apparatus. Fig. 1 represents a large dredge of this type which is now in use for filling in and reclaiming a large tract of land at Far Rockaway, N. Y., on Long Island. It consists of a large rectangular flat-bottomed hull, having at its front end two derrick towers, with braced booms, from which are suspended buckets of the 'orange-peel' type, having four curved triangular sections. Behind the towers are the pumping plant and receivers. The series of operations may briefly be

(Deposition of Philip L. Wilson.)

described as follows, the description referring to one of the two duplicate equipments with which the dredge is fitted: The bucket empties its load into a hopper, A, and when that is filled with the requisite amount of material to fill the pump, a vacuum is created in the cylindrical chamber, B (by a water spray condensing steam therein), so that when the steam-actuated valve, C, is opened the external atmospheric pressure drives the contents of the hopper forcibly through the inlet pipe, D, into the [242] pump, filling it nearly to the top. The inlet valve, E, is opened, while at the same time steam at 10 to 100 lbs. pressure (according to the elevation and the length of the delivery pipe) is admitted at the top of the pump chamber, driving the material out through the discharge pipe, F, the outboard end of which is supported by guys from an A-frame, and to this pipe is connected the shore delivery pipe."

Further reading from Exhibit 15–D, page 380:

"The machines are owned and operated by The Mining & Dredging Power Co., of 68 Broad St., New York, and we are indebted to Mr. John R. Stuyvesant, General Manager of the company, for drawings and photographs from which our cuts have been prepared.

"The principles employed in this dredge are those embodied in the various patents of Edward D. Harsen and Levi Hussey, and now owned by the company, and the company also owns a patented system for the application of the vacuum pump to

(Deposition of Philip L. Wilson.)

the combined operation of dredging and filling. The special features covered by the various patents owned by this company include the following: 1. The steam valve on the vacuum pump; 2. Combination dredge, elevating the material with any kind of elevating device, scoop, clam shell, endless chain, orange-peel bucket, etc., in combination with the receiver and a vacuum pump, the receiver being a regulator in which the material dredged is deposited and mixed to the proper consistency, and thence forced through pipes; 3. A vacuum pump, the intake and outlet valves of which are operated by steam, air, water [243] or any actuating medium; 4. A vacuum pump in which the material is discharged by compressed air and the vacuum formed by the steam from the air compressor."

This is Exhibit 15–E, page 10:

"Vacuum Pump Dredge: Soon after the beginning of the work on this canal two large dredging machines were built at Buffalo and brought by water to the canal."

"The designers of these machines expected that they would give effective and economical results, both in the indurated and in the softer material. The two machines were of exactly the same design and construction."

"The hull is 103 feet long, 34 feet wide and 10 feet deep. There are two decks, the upper one having sleeping and living rooms for the captain and all hands. All parts of the hull and upper works are strongly braced with heavy timbers and steel

(Deposition of Philip L. Wilson.)

rods. The dredge is provided with large water tanks and coal hoppers. There are three anchoring spuds, two forward and one near stern. These are operated by an independent double drum engine. There are two Marine boilers each 150 horsepower, supplied with water by two Blake pumps. Two Steel Vacuum Chambers are near the center of the boat, each cylindrical 5 ft. diameter, 19 ft. high. There is a hopper attached to bow of dredge, 40 ft. long, 12 ft. wide, built of I beams covered with 3/8 in. steel.

"The bottom of hopper slopes to center of boat. A suction pipe 18 inches diameter runs from center of hopper into and close to bottom of hull, backward 35 feet [244] where it connects by a Y to two pipes also 18 inches diameter, going to the two vacuum chambers. From each of these an 18-inch pipe leads aft to a Y whence an 18-inch discharge pipe passes out the stern of the boat. There are four 18-inch valves, one in each brand of each Y. These valves are separately operated by steam pistons controlled at the pilot-house. In the hopper at entrance to suction pipe is a cutter with four 2½-inch blades. This cutter is run by a separate double cylinder engine. A high pressure Blake pump, 10 inches suction and 8 inches discharge, supplies water to the hopper."

"The dredging is done by the orange-peel bucket in the ordinary manner. This lifts the material from the bottom or sides of the excavation and drops it into the hopper which is supplied with

water by the large pump. The cutter is revolving in order to disintegrate the mass of excavated material. Steam is turned into one of the vacuum chambers and then cold water is pumped in through a spray, condensing the steam and forming a vacuum. The forward valve is then opened and the water and excavated material drawn from the hopper into the chamber. The valve is then closed, the real valve opened, steam turned into the chamber forcing the water and excavated material into and through the discharge pipe. While one vacuum chamber is discharging, the other should be filling, their work alternating and the discharge made practically continuous."

This is the quotation from Exhibit 15–F, page 407:

"EMBANKMENT CONSTRUCTION. Of the 128 miles of new [245] line, something like 98 miles are solid fill embankment or through cut. This work comprises all the line on hand and some 4/5 of the line over water. The fill in water will in some cases be of rock, but more usually this will be of marl or sand dredged from the bottom near the right of way. It is planned to place most of this filling with vacuum dredges, as by this process the dredge discharge has a much greater percentage of solids than does usually the discharge of hydraulic dredges, which will also be tried. Orange-peel and clam shell dredges will likewise be used; nearly all of the roadbed on the mainland will be placed by

(Deposition of Philip L. Wilson.)

such dredges working on both sides of the fill and digging their own channels as they progress.

This mainland portion of the line lies through low lands subject to frequent overflow. On the Keys themselves the work will be very light and nearly all embankment. Such cuts as these are through rock too soft for ballast or for concrete."

This is the quotation from Exhibit 15–G, pages 2 and 3:

"We have a lake, which constitutes our reservoir of about 200 acres, and by the raising of the lake it was made to overflow extensive flats, aggregating about 50 acres.

"The depth of the water before dredging varied from nothing to about 9 feet, and the depth of the much from 1 to 12 feet with an average of about 6 feet. The result was that the water was very much injured, becoming almost unfit for use. It was decided to clean [246] out these flats, and, in order to do so, without injuring or wasting the water during the operation, it was necessary to be very careful in choosing the method. Centrifugal pumps were excluded because they would require a stirrer to feed the suction, thus soiling the water, and wasting too much. The method finally approved by the engineers and adopted was proposed by Messrs. Babcock, Lary & Co., Contractors of Newburgh, N. Y., who skillfully and successfully completed the work. The method adopted was this. A large scow was built, with a bin in the bow, about 10 to 20 feet, and about 4 feet deep. A vacuum

pump or chamber was placed upon the scow and fed by two boilers. The suction pipe lead from the bin to the vacuum chamber with an intervening inlet gate. A discharge pipe lead through the scow, with a discharge gate at the chamber. A derrick, with a swinging boom, supporting a Heywood Bucket, holding 2 yds. of material, was mounted on the bow with the necessary hoisting machinery. This discharge pipe was connected with a 15-inch pipe placed upon pontoons made of barrels and carried to the shore, where it was connected with the shore line leading to the dumps. We carried it to a distance of from 500 to 3,000 feet with a maximum lift of about 44 feet.

"The operation was this. The bucket lifted the material into the bin, the vacuum was formed in the usual manner, the inlet gate was lifted, and the charge filled the chamber. Then the inlet gate was shut, the outlet gate opened, steam was let in, and the much was [247] driven to the dumps. The material was almost wholly much, varying from a consistency of peat to light fibrous material."

Mr. WUPPER.—Each and every portion of the above answer is objected to on the grounds as given in the objection to the question and also on the grounds that the answer is hearsay, not the best evidence, irrelevant, immaterial and incompetent.

Cross-examination (Resumed).

Mr. WUPPER.—I now request you to recopy the first question of the cross-examination into the rec-

(Deposition of Philip L. Wilson.)

ord and read it for answer by the witness, which question is as follows:

Q. "Without waiving any objections previously made I would like to ask the witness one question regarding defendant's Miami Exhibit 15–C, an alleged copy of 'The Railway Age,' Vol. XLIII, No. 16, at page 633 thereof. Referring to said page 633, is the marked portion of the reading matter thereof pertinent to the illustration at the upper left-hand portion of this sheet?"

A. The photograph labeled "Key West Extension—A Filling of Pulverized Coral" shows a discharge line of the dredge "Babcock" on the fill between Upper and Lower Matecumbe. The printed matter is misleading as it tends to show that the material between the flash boards is coral rock, while as a matter of fact the filling is marl and a correct description of marl would be to say that it is a finely pulverized coral rock. [248]

DEPOSITION OF GEORGE T. WARNER, FOR DEFENDANT.

GEORGE T. WARNER, defendant's witness, whose deposition was taken at Miami, Florida.

My name is George T. Warner. My age is 73. I am a police sergeant and my residence is 555 S. W. First St., Miami, Florida. I was connected with the Babcock-Lary Dredging Company from 1896 until, I should think, about 1902 or 1903, as I remember. The Babcock-Lary Dredging Com-

(Deposition of George T. Warner.)

pany was located at 29 Broadway, New York. They built vacuum dredges.

A vacuum dredge is a dredge using a bucket and a chute hopper. The bucket is used to take the material up from the bottom and deposit it in the hopper. When a sufficient quantity is placed in the hopper, a gate is opened leading to the vacuum pump and the material is sucked into the vacuum pump. The gate is then closed in the hopper and the expelling gate or outlet is opened and the material in the pump driven out through a pipe. The material is conveyed in the pipe to the point where it is deposited. A vacuum is formed in a large cylinder by steam—condensation of that steam forms a vacuum—the steam is forced in against an umbrella-shaped formation in the pump, which stirs the material up and when loosened it is forced out through the pipe. This umbrella-shaped formation is known as a baffle—striking against the baffle at the top of the vacuum pump, that throws the steam around the sides. The material is discharged out through a pipe.

The dredge "Babcock" was built in New York somewhere shortly prior to 1896 and operated for several years on Long Island, New York, and in and about New York. The dredge "Rough Rider" was built at Massena, New York, did some work up there which I had nothing to do with, was then brought down to New York and later on brought to Savannah, Ga. Both dredges, the "Babcock" and "Rough Rider" were under my control in

(Deposition of George T. Warner.)

Savannah, Ga. They were used in [249] the river to build the Seaboard Air Line Terminal—freight terminal—and we built three slips into the marsh with those two dredges, principally the "Babcock." The first slip was 1,500 feet long; that is from the river bank; the second slip was 1,000 feet long and the third slip was 800 feet long. Each of them was about 200 feet wide. The river we widened was opposite the city of Savannah, 135 feet I think,—as well as I can remember, 27 years ago. 1899 we commenced work and I think we finished that work there in 1902. Both dredges, the "Babcock" and the "Rough Rider," worked in the river at Savannah. There were differences in the structure and operation of these two dredges. The "Babcock" had one vacuum pump. The "Rough Rider" had two. The "Rough Rider" was built with the intention of using the pumps alternately, while one pump was being emptied the other would be filling. We found that didn't work first rate so we only used one pump in the "Rough Rider." The "Babcock" was used with one pump altogether.

We handled everything under the sun with the "Babcock" at Savannah. We picked up skulls, Spanish money, buttons off the coats of Revolutionary British Soldiers, rock, sand, everything else—watches—everything we found in that pump. The river and these slips that we dug in were on an old rice field opposite the city of Savannah and it was on that island—Hutchinson Island—that the

(Deposition of George T. Warner.)

British soldiers were in camp during the Revolutionary War, and it was the remains that a great many of the old camps left there that were disturbed. We dug up a number of wrecks and of old British gunboats. We recovered old British muskets which fell to pieces with the rust when we picked them up. We picked up old cannon and almost everything that you can name.

The "Babcock" had a 15-inch discharge pipe and the "Rough Rider" an 18-inch discharge pipe. We could put everything through the "Babcock" pipe of 15 inches that was anywhere from six to eight or ten inches. I did know of some pieces of rock going [250] through that were 12 inches in diameter. On the dredge the "Rough Rider" the rock or materials which did go through were proportionately the same.

The "Babcock" on the work I have just described was forcing material from 500 feet to 2,000 feet. I don't think we ever went over 2,000 feet.

Savannah was a naval stores port. Foreign vessels would come in there for the purpose of loading with naval stores. They would come in ballast. That ballast was thrown out largely at the point where we dug slip three, and it was said that a man of any nation could go ashore on that dump and stand on his native soil, meaning, in other words, that vessels from all over the world came there and loaded naval stores.

We had to get that ballast out and the only way we could get it was to dredge it out. We lifted it

(Deposition of George T. Warner.)

with the bucket, as I have before described, and put it in the hopper. Anything under 12 inches or up to 12 inches we could force through the pipe and out with the sand and other material. If it was larger than that we would have to pick it out by hand and throw it over.

The Savannah operation which was commenced in 1889 was continued, I think, until early in 1902—possibly the last part of 1901.

I continued with the dredges "Babcock" and "Rough Rider" after that period. I think the next work we did with the "Babcock" was at what was known as the "Plant System." That was a railroad that ran into Savannah at the time known as the "Plant System." I guess it was an organization of a number of roads put together and known as the "Plant System." The dredge worked on that job about two months, I think. That would be, I think, in 1902 or 1903; I can't be sure. After that we did some work for [251] the Government, deepening the channel at the Savannah River. We went from what is known then as West Broad Street up the river.

I left the Babcock-Lary Dredging Company, I think, in 1903 or 1904, when they went to the wall, and went with the Empire Dredging Company. I got Mr. H. P. Smart and some of his friends interested and they authorized me to bid in or see that the dredges "Rough Rider" and "Babcock" were purchased. The "Rough Rider" was purchased by that organization for $16,000.00; the "Babcock"

was purchased by the same parties for either $4,500 or $5,000. I was manager of that company until the dredges were sold in, I think, the early part of 1905, or the latter part of 1904, to the Florida East Coast Railway.

After the dredges were sold to the railroad in the latter part of 1904 or early part of 1905, I came with the dredges to Miami. After we came to Miami we went into the construction of the Florida East Coast Extension. I was with the "Babcock" mostly at that time and I think along in October, 1905, I went down to Jewfish Creek and Lake Surprise with the "Babcock." The other dredges followed later.

The "Babcock" and "Rough Rider" were both used more on the Keys than in the Everglades, and the character of the material which they picked up was coral rock, sand, and so on. Of course, we ran into some marl, but very little. The other dredges, not the "Babcock" or the "Rough Rider," and I presume you are not interested in them, they did marl work. In these dredges the vacuum was formed by steam condensation in the vacuum pump so called.

The "Babcock" was built somewhere shortly prior to 1896; I think in 1895 or 1896 in New York. The mechanical [252] engineers claimed that a dredge could not be operated that way. The "Babcock" demonstrated that it could be successfully operated. The reason for the building of the vacuum dredge was that the vacuum dredge could put out from 40

(Deposition of George T. Warner.)

to 60 per cent of solid matter and the rest water, while the centrifugal form of dredge put out about 15 per cent solid material and about 85 per cent water. The reason was [253] that the vacuum dredges were used to a large extent where a small volume of water was required to do the work.

Q. I show you Miami Exhibit 15–H and Miami Exhibit 15–I and ask you to examine said exhibits, which are copies of a certain dredge patent issued to one L. Hussey, and state from such examination as to any similarity or dissimilarity between the dredges as shown on such exhibits, and the dredges "Babcock" and "Rough Rider."

A. This is a very good exemplication. Here is the bucket—here would be the chute—here would be the vacuum pump—here would be where the vacuum would be formed—the suction would be from the chute into this pump—when it arrived at the point that the gauge would show was right, this gate would be closed—this gate would be opened—and the vacuum would throw the material out. (The witness pointing out various places on Miami Exhibit 15–I.)

Mr. WUPPER.—Objected to on the ground that it is incompetent, irrelevant and immaterial.

Q. The figure to which you refer in your last answer in Miami Exhibit 15–I; is that correct?

A. Yes, that is all right.

Q. And the gates to which you refer on said figure, can you state if they are marked with letters or any other designation on said exhibit?

(Deposition of George T. Warner.)

A. Well, that would be practically the same. This is the discharge pipe here.

Q. This letter "B." This letter "A," as I take the drawing—no, this would be the chute here, letter "B" would be the chute. This small "B," I take it, would be the gate here. [254]

Q. But, as I understand you, you say that Exhibit 15–I, the figure of dredge shown thereon is similar to the "Babcock" or "Rough Rider" or both?

A. The "Babcock" particularly, because there is only one pump; the "Rough Rider" had two pumps.

Q. What have you to say about the figure shown on Miami Exhibit 15–H, as to any similarity or dissimilarity with the "Rough Rider" and "Babcock"?

A. Well, I assume here that this is the discharge pipe—that would be the vacuum pump, of course—

Mr. WUPPER.—Objected to as irrelevant, incompetent and immaterial.

A. (Continued.) Here would be where the steam was drawn in to form the vacuum up here. This letter "a" inside the vacuum pump is the umbrella-shaped piece which I described in my testimony.

Q. The small letter "a" on the figure of Miami Exhibit 15–H is that what you refer to?

A. Yes, sir.

Q. The letter "a" above the capital letter "P"?

A. Yes, sir.

Q. State whether or not as a whole the dredge

(Deposition of George T. Warner.)

shown on that Miami Exhibit 15-H is similar to the "Babcock" and "Rough Rider," or dissimilar.

A. It is similar—I can only find one fault with it—I think the material is shown a little higher in there than we found was feasible in the operation of the dredge. But it is practically all right—it is practically the same.

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. (Continued.) Here is the umbrella-shaped piece that I [255] described—this is the steam coming in—this brings the material up—this gate is closed—it is forced out through this pipe. (Pointing to Exhibit 15-H.)

Q. I show you Miami Exhibit 15-C and particularly the illustration on page 633, under which appears the title "Key West Extension—A Filling of Pulverized Coral," and also the illustration alongside under which appears the title "Key West Extension—Pipe Line on Pontoons," and ask you to examine said exhibit and said illustration and state whether or not you are able to identify the illustrations or either of them.

A. Yes; this is correct.

Q. Which illustration is that, Captain Warner?

A. This is correct. That is where it is carried on a trestle; this is where it is carried on pontoons. That would be filling in between these two points here. (Pointing to Exhibit 15-C.)

Q. Can you or do you or not recognize either of

(Deposition of George T. Warner.)

these illustrations as an illustration or picture or photo of any particular dredge or pontoons or not?

A. These pontoons represent, as far as I can see, almost exactly the pontoons used by the two dredges, particularly the "Babcock."

Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I will ask you whether or not you saw these exhibits, Miami Exhibit 15–H and Miami Exhibit 15–I and Miami Exhibit 15–C, which you have just examined—whether you saw them before you took the witness-stand this afternoon or not.

A. This is the first time I have ever seen them. [256]

Cross-examination.

(Interrogatories by Mr. WUPPER.)

Q. Referring to the work that was done by the dredges "Babcock" and "Rough Rider" at Savannah, wasn't it frequently necessary to pump nothing but water to make the material flow?

A. Not altogether so, but we were filling in behind embankments and a great volume of water was apt to undermine or destroy these embankments, and for that reason the vacuum dredges were used. The right of way was built up by forming dikes fifteen feet high on top of the marsh, and we filled in between these two embankments, and a volume of water was apt to undermine them or destroy them, and for that reason the "Babcock" particularly was in demand.

(Deposition of George T. Warner.)

Q. And you said the discharge from these two dredges was somewhere between 40 or 50 or 60 per cent water? A. Yes, sir.

Redirect Examination.

(By Mr. GILLESPIE.)

Q. I believe you said, however, one dredge had a greater discharge of water than the other?

A. Only by reason of the fact that it had a larger discharge pipe and a larger vacuum pump.

Q. Which one was that?

A. That was the "Rough Rider." [257]

DEPOSITION OF ERNEST COTTON, FOR DEFENDANT.

ERNEST COTTON, a witness for defendant, whose deposition was taken at Miami, Florida.

My name is Ernest Cotton; I am 47 years of age; I reside in Miami, Florida, at 1611 N. W. 8th St., and I am director of public service for the city of Miami, Florida. I once had the occupation of railroading. I was with the Chicago & Northwestern on extra gang work; with the Illinois Central, directly under the bridge engineer, and with the Florida East Coast Railway on construction work. I went with the Florida East Coast Railway in 1904. I was on survey work for that company. After that I did concrete investigation; resident engineer and division engineer.

I studied civil engineering. I belong to the American Society of Mechanical Engineers.

(Deposition of Ernest Cotton.)

On the Florida East Coast Railway in the early building of the railroad known as the Key West Extension they employed bucket dredges, either clam shell or orange peel, dipper dredge, suction dredge and impulse dredge.

Describing in detail the impulse method of operation and the machinery employed for it,—the material was handled from its original position by bucket, either clam shell or orange peel, deposited into a hopper on the forward part of the machine, and conveyed from the hopper by means of a pipe to what is known as a vacuum pump, and discharged from the vacuum pump by steam pressure, the vacuum being formed in the vacuum cylinder by first admitting the steam and filling the cylinder with steam, and then cooling that cylinder by water pumped in over the top. Condensation of the steam would then create a vacuum, the gate between the pump and hopper would be open; then the difference in pressure on the hopper and less pressure in the cylinder would cause that material to be drawn into the vacuum cylinder, and when the vacuum had been filled with the material, the gate from the hopper to the [258] cylinder would be closed, the outlet gate would be opened, and steam turned in the top of the cylinder, which would force the plug of material out the cylinder and through the discharge pipe at the stern of the dredge and then through a pipe to the fill, that pipe being carried either on pontoons or trestle work.

(Deposition of Ernest Cotton.)

Q. I show you a paper which has the words "Exhibit 13" in the upper right-hand corner thereof and the seal of Paul D. McGarry, Notary Public, State of Florida, impressed in the lower left-hand corner thereof, and ask you to examine that and state what it is, if you know.

A. This was a sketch, a rough sketch, I made to exemplify the construction of a machine like the "Rough Rider" or "Babcock."

Q. As I understand you to say, you personally made this sketch? A. Yes, sir.

The sketch made by witness is offered in evidence in Miami, Florida, as Defendants' Exhibit 13.

By Mr. WUPPER.—The exhibit is objected to as irrelevant and immaterial and as not properly proved as to the location of the original.

Q. Mr. Cotton, you testified heretofore as a witness in the case of Concrete Mixing & Conveying Company against Great Western Power Company of California, pending in the United States District Court for the Northern District of California, and also in the case of Concrete Mixing & Conveying Company against Stone and Webster, Incorporated, pending in the United States District Court for the District of Massachusetts, did [259] you not?

A. Yes, sir; three or four months ago.

Q. The sketch, Exhibit 13, which has just been introduced in evidence, was that prepared by you this afternoon or on the occasion of your former testimony.

(Deposition of Ernest Cotton.)

A. On the occasion of my former testimony I made a duplicate or carbon.

Q. And the sketch which has just been offered in evidence is one of the carbon or duplicate copies made at that time? A. I think it is the original.

Q. You have here a notation "Suction and discharge line 15" and 18"—on this exhibit; can you explain that, please?

A. The "15 inches" referred to the dredge "Babcock" and "18 inches" referred to the "Rough Rider."

Q. Did you see these two dredges in operation?

A. Yes, sir.

Q. During what period of time? A. 1906.

Q. Was there any particular occurrence to place the date of that operation in your mind?

A. The knowledge of the work under way before the hurricane of 1906.

Q. Are you positive that the dredges were in operation in the manner described on the Key West Extension prior to the 1906 hurricane?

A. Yes, sir.

Q. In what month of 1906 did that hurricane occur? A. October.

Q. Was that just an ordinary sort of hurricane or an unusual event to stand out in your memory? [260]

A. It was my first one, and it did stand out.

Q. Do you know when these two dredges, the "Babcock" and the "Rough Rider," were purchased by the Florida East Coast Railway?

(Deposition of Ernest Cotton.)

A. In 1905.

Q. Who was the engineer in charge at that time?

A. Of the dredges?

Q. Yes, sir.

A. Mr. Wilson became engineer in charge of the dredges after they were bought.

Q. What Mr. Wilson is that?

A. P. L. Wilson—Philip Lindsay.

Q. State as to whether the two dredges referred to were better adapted for handling the substance you had to handle than any other type of dredge.

By Mr. WUPPER.—Objected to as incompetent.

A. Shall I answer it?

Q. Yes, sir.

A. They were better adapted on account of the fact that the materials would be more nearly in the form they were dredged, but particularly adapted to marl work, which we were trying to deposit to get in as nearly as it was dug without throwing it into suspension.

Q. What was the character and kind of material that was handled by these dredges in their operation on the Key West Extension?

A. They handled peat, rock, sand—a mixture—At Jewfish Creek and Lake Surprise, at Tavernier Creek and the opening between Upper and Lower Matecumbe they handled particularly marl.

Q. Will you please give us a description or definition of just what marl is? [261]

A. Finely ground limestone, I should say; shell or rock in practically powder form.

(Deposition of Ernest Cotton.)

Q. What is the effect of the operation or wash of waves upon marl?

A. More the effect of a wave on clay or soapstone material. It presents when wet a slick surface and a surface where a wave does not find many *point* of contact—a smooth surface. A wave will go on a marl bank without tearing up much of the surface and recede in the same way.

Q. Mr. Cotton, I show you here four specimens of rock substance and ask if you will kindly examine them and state from such examination if you know as to what character of rock formation that is, or if it is more than one character, state it.

A. This looks like Miami limestone. This seems to be the same. It is hard to tell what that is—it seems to be limestone with a shell cast. That is Miami limestone. This seems (referring again to this specimen) to be colite—like fish eggs, colitic.

Q. Then do I understand you to say that the four specimens of rock handed you are what you call Miami limestone, or limestone common in the Florida area?

A. Yes, sir. That is, one I wouldn't be able to classify without a fracture. It might be Miami limestone, from the formation here, or from the Keys, or from Cuba.

By Mr. GILLESPIE.—The four specimens of rock just handed the witness are offered in evidence at Miami, Florida, as Miami Exhibits 14–A, 14–B, 14–C and 14–D respectively. The specimen

(Deposition of Ernest Cotton.)

about which the witness was not positive as to its nature being Miami Exhibit 14–D.

Q. I will ask you, Mr. Cotton, whether or not any of said specimens are coral rock. [262]

A. I wouldn't call them that.

Q. State whether or not the dredges "Babcock" and "Rough Rider" conveyed rock of the character just introduced in evidence in their operations on the Key West Extension.

A. Just what do you mean by similar to that character?

Q. I mean as to their size or substance.

A. Size, yes; but as far as their being limestone, the portion they worked over is underlaid with coral rock, which is different from this in its structure and in its chemical analysis as it would run higher in lime content that is calcium carbonate.

By Mr. WUPPER.—The exhibits are objected to on the ground that they are immaterial and irrelevant and the answer is objected to as incompetent and immaterial.

Q. I show you Miami Exhibit 15–C and ask you to turn to the illustration on page 632, under which appear the words "Key West Extension—Sample of Coral Rock," and state whether or not you are able from the illustration to identify the rock shown therein as coral rock or not.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. This seems to be coral rock.

(Deposition of Ernest Cotton.)

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I show you Miami Exhibit 15–I, being a copy of Hussey Patent No. 526,530, and ask you to examine the figure of that patent and state whether it is similar to or dissimilar from either the dredges "Babcock" or "Rough Rider."

A. Schematically it is similar. There are differences. Did you want to know the differences? [263]

Q. The scheme as a whole you say is similar?

A. Yes, sir.

Q. Yes; will you point out the material differences?

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. This boom swings all the way around. The boom on the "Babcock" and "Rough Rider" only went through about 160 degrees. Also different in the hopper being outboard in front instead of behind the derrick.

Q. I show you Miami Exhibit 15–H, being copy of Hussey and Harson Patent No. 497,427, and ask you to examine same and state whether the figure shown thereon is similar to the dredge "Babcock" and "Rough Rider," or dissimilar.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

A. This is not a dredge at all. This is where a vacuum is created by steam, probably, and then

(Deposition of Ernest Cotton.)

compressed air is used as the means for pushing the plug out of the cylinder.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I now show you Miami Exhibit 15–A and ask you to examine same and read particularly the excerpts marked "A" and "B" in pencil on pages 404 and 405, and state what you know yourself as to the facts stated or referred to in said excerpts.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. They use the word "leather" there instead of "rubber" in speaking of the sleeve that joins the two pipes.

Q. In other respects, are the facts therein stated accurate within your knowledge? [264]

A. I believe so.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

Q. I show you Miami Exhibit 15–B and ask you particularly to read excerpt marked "A" in pencil on page 227 and state what you may know in regard to the facts stated in said excerpt, particularly with reference to the two dredges and the dredging operations about which you have been testifying.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. To my knowledge, I don't remember that a suction machine was tried out on these jobs first. It says "a persistent attempt was made to construct"—and at the same time I am not sure that a

(Deposition of Ernest Cotton.)

suction dredge was ever tried out on that. That is one of the openings that the impulse machine worked on, and the majority of the work between Upper and Lower Matecumbe.

Q. Are the other facts and description as given in said excerpt correct to your knowledge?

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. Yes, sir.

Q. I now show you Miami Exhibit 15–C and ask you particularly to examine the two illustrations on page 633, captioned "Key West Extension—A Filling of Pulverized Coral" and "Key West Extension—Pipe Line on Pontoons," and to state whether or not you are able to identify either of said illustrations as illustrations of any particular pontoons or dredges or not.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. The illustration at the upper left-hand side of page 633 is what I would identify as the fill between Upper and Lower Matecume. The pontoon line might belong to the "Rough Rider" or the "Babcock" or a suction dredge. [265]

Q. Is the pontoon line shown in these illustrations similar to the pontoon lines on the dredges named?

A. Similar, yes.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

Q. Would you kindly read the little excerpt marked "B" on page 633 and state what you, of

(Deposition of Ernest Cotton.)

your own knowledge, know as to the facts therein stated, and your agreement or disagreement with that statement.

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. "The coral rock, of which a considerable portion of the roadbed is composed, makes excellent ballast. As before stated, this crushed coral becomes as hard as rock after exposure." The coral of which he speaks is not coral, but the rock is a coral rock formation, which means it is a sedimentary rock in which there are coral casts. There might be large niggerheads of coral surrounded by limestone. As to the "hardening effect after exposure," it is as hard when you get it out as it becomes. There may be a little sunbaking or weathering, or the softer portions may be softer than the hard portions, but rock is a hard rock to start with. I don't mean hard in comparison with granite, but it is hard in comparison with our soft Miami limestone here.

Q. I now show you Miami Exhibit 15–F and ask you to read the excerpt marked in pencil on page 407 as to embankment construction, and state as to your knowledge of the same.

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. They planned to fill the opening with the vacuum [266] dredges, but that didn't obtain. It was found too hard to get fresh water for the steam required for these machines. Therefore they were

(Deposition of Ernest Cotton.)

abandoned and turned into a different type of machine afterward. This was the Lower Matecumbe and Upper Matecumbe fill.

Q. With the exception just stated by you, does or not the excerpt which you have read describe the embankment construction as it was done?

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. This isn't a very good description of embankment construction. It simply makes a statement of about how many miles of water work and how many miles of land work there would be.

Q. I now show you Miami Exhibit 15–D, and particularly the first sheet thereof, showing several drawings and illustrations of the Hussey Delivering Dredge, and ask you to examine same and also to read the description thereof as marked in pencil on pages 379 and 380 and state its similarity to or dissimilarity from said Hussey dredge and the "Babcock" and "Rough Rider."

By Mr. WUPPER.—Objected to as leading, incompetent and irrelevant.

A. On the drawing the general scheme is the same as on the "Babcock" and "Rough Rider"; except that the dredge here—the "Hussey"—is shown with two derricks handling buckets, swinging to hoppers back of the derricks, whereas the "Babcock" and "Rough Rider" delivered forward. The general scheme for pump valves is the same. The discharge scheme is the same, except this would be operated on a short line. The description here

(Deposition of Ernest Cotton.)

describes almost identically the "Babcock" and "Rough Rider" so far as the *modus operandi* is concerned. [267]

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. I show you both at once Miami Exhibits 15–E and 15–G and ask you to read the portions thereof marked in pencil and state whether same tally with the description of the "Babcock" and "Rough Rider" dredges in a general way or not.

A. Yes, sir; this is a very good description of the "Babcock" here, as far as the operation is concerned.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

Q. When did you first see these Exhibits 15–A to 15–I inclusive?

A. I may have seen some of these pictures in magazines when they came out. These photostatic copies here—when I testified before, I am not sure whether any of these were among them or not. But this was not among them—15–D—this is the first time I have seen this. This is the first time I have seen this one, 15–G. This is the first time I have seen 15–C. This is the first time I have seen this one, 15–H—and 15–I. It is the first time I have seen that.

Q. It may be possible that you saw one or two of these photostatic copies before, or the originals when the magazines were published?

A. I may have seen the magazine articles.

(Deposition of Ernest Cotton.)

Cross-examination.

(By Mr. WUPPER.)

Q. With reference to Exhibits 14–A, B, C and D, you stated that they appeared to be similar to the limestone found around the city of Miami; it couldn't very well be from some other part of the county, could it? [268]

A. Well, I wouldn't say that, because so far as we know there is no other limestone similar to the Miami limestone, so Sanford stated in his geological reports.

Q. Well, I know I haven't seen anything any place else that is the same as this Miami limestone. Take Sioux quartzite; for instance, there are very few places where such quartzite is found, you know. Certain rock have a separate structure.

Mr. TOWNSEND.—Now, we come to the New York depositions. I have not had a chance to open them, but I understand they are the depositions of Mr. James McIlvrid, Harry C. Laporte, Julian A. Sohon and Clinton H. Crooks.

We offer these depositions in evidence.

(Said depositions of Julian Sohon, James McIlvrid, Harry C. Laporte and Clinton H. Crooks were received in evidence, said depositions reading as follows:) [269]

DEPOSITION OF JULIAN A. SOHON, FOR DEFENDANT.

JULIAN A. SOHON, defendant's witness, whose deposition was taken at New York City, on September 6, 1927.

My name is Julian A. Sohon; I am 31 years of age; my residence is 314 Patterson Ave., Hasbrouck Heights, New Jersey, and I am chief Bibliographer in the Engineering Societies Library at 29 West 39th St., New York City. I have been connected with the library seven years. I have the degree of Bachelor of Chemistry from Cornell University. That degree was granted in 1918.

The Engineering Societies Library comprises the four libraries of the American Society of Civil Engineering, the American Society of Chemical Engineering, the American Institute of Electrical Engineers, and the American Institute of Mining and Metallurgical Engineers. There are approximately 150,000 volumes in the Engineering Societies library.

I am often called upon in litigated matters to prove scientific and technical books and publications.

Q. To what extent are the books and records of this Library accepted as evidence in such cases?

A. I know of no case in which they have not been accepted.

By Mr. WUPPER.—Objected to as incompetent and irrelevant.

(Deposition of Julian A. Sohon.)

A. It is not customary to permit volumes to leave the library. It would not be done without being compelled by legal process.

Q. Have you among your records, the "Engineering News" of 1902, Volume XLVII, Number 1, and more particularly page 1 of said volume? [270]

Witness looks for volume referred to and states it is being used in the Library at the moment.

By Mr. HILLIARD.—It is hereby stipulated and agreed that true copies of such publications as may be offered in evidence in the deposition of this witness and of the witnesses McIlvrid, Crook and LePorte, may be introduced in evidence with the full force and effect of the originals, and counsel for plaintiff hereby waives his objection to such copies merely on the ground that they are copies and not the originals provided the defendant before trial of this case shall supply the plaintiff's counsel with similar copies.

By Mr. WUPPER.—We will so stipulate with regard to copies of publications only, and if the copies are furnished to us free of charge.

(By Mr. HILLIARD.)

The previous question is withdrawn pending the arrival of the volume referred to.

Q. I show you an article entitled "Concrete Viaducts on the Key West extension of the Florida East Coast Railway," by George P. Carver, and ask if you will tell us what publication that article appears in?

(Deposition of Julian A. Sohon.)

A. That is in the "Engineering Record" of October 20th, 1906, Volume LIV. Number 16, 424 to 427.

By Mr. HILLIARD.—A photostat copy with illustrations of said article is hereby offered as New York Defendant's Exhibit No. 20.

By Mr. WUPPER.—The exhibit is objected to as immaterial and irrelevant. [271]

(By Mr. HILLIARD.)

Q. I call your attention to an article entitled "Key West extension of the Florida East Coast," by Harry C. Smith. Will you state what publication that appears in?

A. That is in the publication "Railroad Gazette" of April 20, 1906, Volume XL, Number 16, pages 404 to 406.

By Mr. WUPPER.—For the purpose of objection, I should like to ask one question.

Q. You have no personal knowledge of the date or fact of this publication except that you find it in the records of the Library?

A. I find it in the records of the Library.

By Mr. WUPPER.—The testimony is objected to on the ground that the date of the publication is not properly proven.

By Mr. HILLIARD.—I offer in evidence a photostat copy of this article as New York Defendant's Exhibit No. 21.

By Mr. WUPPER.—Same objections as to Exhibit No. 20.

(Deposition of Julian A. Sohon.)

(By Mr. HILLIARD.)

Q. Are these publications which contain Exhibits 20 and 21 a recognized authority on the subjects in which they deal? A. They are.

Q. I show you an article entitled "Florida East Coast Railway Key West Extension" by Howard Egleston, Tell us what that article appears in and the nature of the publication, date, etc.

A. This article is in the periodical "Engineering —Contractings," [272] of October 16, 1907, Volume XXVIII. Number 16, pages 227 to 228. The first page of this issue contains a stamp showing that it was received by the Library on October 21, 1907. This periodical is also one of the leading periodicals in its field.

(By Mr. WUPPER.)

Q. Your knowledge of the date on this publication and its contents is based on your connection with the Library, is it not? A. It is.

By Mr. WUPPER.—The testimony is objected to as incompetent and not sufficient knowledge of the date of the publication, Mr. Hilliard, may this objection be understood on all the publications to save time?

By Mr. HILLIARD.—Why, yes. It is understood that this objection will apply to all the publications which are to be identified by Mr. Sohon.

By Mr. HILLIARD.—I offer this article last referred to as New York Defendant's Exhibit No. 22.

(Deposition of Julian A. Sohon.)

By Mr. WUPPER.—Same objection as to the publication.

(By Mr. HILLIARD.)

Q. I show you an article entitled "Construction of Florida East Coast Railway," by Allan Hale. Will you please tell us what book this is from, the date, etc?

A. This is in the "Scientific American" of May 16, 1907, Volume XCVI, Number 20, pages 412 and 413. [273]

By Mr. HILLIARD.—I offer copy of this article last referred to as New York Defendant's Exhibit No. 23.

By Mr. WUPPER.—Objected to as irrelevant and immaterial, and of an alleged date subsequent to the filing date of the application of the patent in suit.

(By Mr. HILLIARD.)

Q. I call your attention to an item entitled "A Florida East Coast Railway Extension to Key West was opened," etc. What periodical does that appear in, page and date?

A. This is in "Engineering News" of January 16, 1908, Volume LIX, Number 3, page 75.

By consent, the witness reads the following statement:

"The Florida East Coast Railway Extension to Key West was opened and has been completed from Miami to Knights Key, 109 miles, and was formally opened for traffic recently by the running of the first passenger train over the line, carrying the

(Deposition of Julian A. Sohon.)

principal officers of the road including its president, Mr. Henry M. Flagler. At Knights Key, connection is made with a steamers for Havana, only six hours distant. Another year will be required to complete the remaining 47 miles to Key West. On the completed portion, the total length of railway constructed in or over the water is 72,884 feet, or about 14 miles. The Southern section to Key West will add 78,550 feet to this, or there will be nearly 30 miles in all of over-water construction on the completed road."

By Mr. WUPPER.—Same objections. [274]

By Mr. HILLIARD.—I show you an article entitled "The Key West Extension of the Florida East Coast Railway." Please state what periodical this appears in, date, etc.?

A. This is in "The Railway Age" of April 19, 1907, Volume XLIII. Number 16, pages 630 to 634.

Q. What is the character of this publication, "The Railway Age"?

A. "The Railway Age" is one of the leading railway periodicals.

By Mr. HILLIARD.—I offer in evidence a copy of the article last referred to as New York Defendant's Exhibit No. 24.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to a further article entitled "Key West Extension of the Florida East

(Deposition of Julian A. Sohon.)

Coast Railway." Will you please state what periodical this appears in, its date, etc.?

A. This is in "Engineering News" of October 19, 1905, Volume LIV, Number 16, pages 407 and 408.

Q. Is there anything on 409?

A. And also figure 4 page 409.

By Mr. HILLIARD.—This article is offered in evidence as New York Defendant's Exhibit No. 25.

By Mr. WUPPER.—Same objections except for lack of alleged priority.

(By Mr. HILLIARD.)

Q. I show you an article entitled "The use of compressed air in tubular foundations, and its application at South [275] Street Bridge, Philadelphia" by F. E. Collingwood, member of the Society, and ask what book this appears in, the date, etc.?

A. This is in the "Transactions of the American Society of Civil Engineers," Volume VIII, July 1879, pages 186 to 188.

Q. What is the character of this publication?

A. This is the official publication of the leading civil engineering society in this country.

Q. How often are these transactions published and what is the usual procedure, annually, semi-annually, or what?

A. These publications are issued monthly.

By Mr. HILLIARD.—I offer this article in evidence as New York Defendant's Exhibit No. 26.

By Mr. WUPPER.—Same objections.

(Deposition of Julian A. Sohon.)

(By Mr. HILLIARD.)

Q. I show you an article entitled "The Shone Hydro Pneumatic System of Sewage," by Uban H. Broughton, of December 31, 1892, and ask what periodical this appears in?

A. This is in the "Transactions of the American Society of Civil Engineers," Volume XXVII, December 1892, pages 659 to 674.

By Mr. HILLIARD.—I offer in evidence page 659 and pages 662, 663, 664, 665, and 666 and ask that they be offered in evidence and marked New York Defendant's Exhibit No. 27.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.) [276]

Q. I show you a volume with a paragraph entitled "Grouting by compressed air" and ask where and in what volume that appears?

A. This is on pages 62, 63 and 64 of Minutes of Proceedings of the Institution of Civil Engineers, paper 2873 by James Henry Greathead, Volume CXXIII, 1896. The entire paper is on pages 39 to 73.

By Mr. HILLIARD.—I offer these pages 62, 63 and 64 in evidence as New York Defendant's Exhibit No. 28.

By Mr. WUPPER.—Same objection.

(By Mr. HILLIARD.)

Q. I call your attention to another volume, to a paragraph entitled "Duckham's pneumatic dredger." Will you state what book that appears in, the date, etc.?

(Deposition of Julian A. Sohon.)

A. This is in an article entitled "Dredging Operations and Appliances" by John James Webster, which appeared as paper 2157 in the Minutes of Proceedings of the Institution of Civic Engineers, Volume LXXXIX, 1887, pages 2 to 32. The paragraph in question is on page 15.

By Mr. HILLIARD.—I offer in evidence page 15 of this publication as New York Defendant's Exhibit No. 29.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another volume, and call your attention to page 303 thereof. Will you please tell us what that article appears in—what publication—date, etc.

A. This page is included in an article entitled "Grain Appliances at the Mill Wall Docks" by Frederic Eliot Duckham. This is paper 2784 and appeared in Minutes [277] of Proceedings of the Institution of Civil Engineers, Volume CXXV., 1896, pages 296 to 309.

By Mr. HILLIARD.—I offer in evidence page 303 of this publication as New York Defendant's Exhibit No. 30.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—In this same publication I call your attention to page 386, and offer that page as New York Defendant's Exhibit No. 31.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to an article entitled

(Deposition of Julian A. Sohon.)

"Pneumatic Machinery for Loading" by Frederic Duckham, and ask if you will state what publication that appears in and in connection with it the two plates numbered XXX and XXXI?

A. This is in the "Transactions of the Institution of Naval Architects" Volume XL, 1898, pages 127 to 132, and plates numbered XXX and XXXI are found in the back of this volume.

By Mr. HILLIARD.—I offer in evidence pages 127 to 131 inclusive and plates numbered XXX and XXI as New York Defendant's Exhibit No. 32.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you an article entitled "Compressed Air Dredger for Gold Mining" and ask what periodical it appears in?

A. This is in a periodical "Compressed Air," March, 1898, Volume 3, number 1, page 403.

Q. What is the standing of this periodical and to what [278] extent is it known?

A. This periodical has been in existence for about thirty years.

Q. Is it a recognized authority on compressed air matters. A. I do not know.

Q. Is it a publication of general circulation in its lines? A. Yes.

By Mr. HILLIARD.—I offer in evidence this article, particularly page 403 as New York Defendant's Exhibit No. 33.

(Deposition of Julian A. Sohon.)

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

A. I show you another volume on Compressed Air containing the article "The interesting example of the Pohl Air System" and another article entitled "Some information in regard to air lift pumping." What periodical are these in?

A. These are in the periodical "Compressed Air" January, 1902, Volume 6, number 11, pages 1655 to 1658 and 1658 to 1659.

By Mr. HILLIARD.—I offer in evidence pages 1655 to 1659 inclusive as New York Defendant's Exhibit No. 34.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to another article entitled "Removing sand from wells by compressed air." Will you please state what periodical this appears in, date, etc.?

A. This is in the periodical "Compressed Air," August, 1902, Volume 7, Number 6, pages 1941 to 1943. [279]

By Mr. HILLIARD.—I offer in evidence these pages 1941 to 1943 as New York Defendant's Exhibit No. 35.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to three articles in this volume, first, the "Liernur Pneumatic Sewage System at Stansted," another article entitled "Compressed Air in the elevation of tailings," an-

(Deposition of Julian A. Sohon.)

other "Cyanidation at the Kalgoorlie Mine." Please tell us the periodical they appear in, dates, etc.?

A. The first article is in "Compressed Air," August, 1903, Volume 8, Number 6, pages 2515 to 2516. The second article is in "Compressed Air" September 2903, Volume 8, Number 7, page 2566 to 2567, the third article is in "Compressed Air," October 1903, Volume 8, Number 8, page 2594 to 2598.

By Mr. HILLIARD.—These pages and articles are all offered in evidence as New York Defendant's Exhibit No. 36.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. In the same volume I call your attention to an article on pages 2723 to 2735 inclusive, and ask if you will state on what date that article appeared, what periodical, etc.?

A. This is in "Compressed Air," January 1904, Volume 8, Number 11.

By Mr. HILLIARD.—A copy of that article is also offered in evidence as New York Defendant's Exhibit No. 37.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.) [280]

Q. I show you an article entitled "Compressed Air for Electric Railway Shop." Please state where that appeared, date, etc.?

A. This is in "Compressed Air" May 1904, Volume 9, Number 3, pages 2911 to 2922.

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—I offer this article in evidence as New York Defendant's Exhibit No. 38.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I refer you to page 2975 to "Compressed Air." Please tell us what the article refers to and what is the date of publication?

A. This is part of an article entitled "The New York and Brooklyn Tunnel for the Rapid Transit Railroad" which appeared in "Compressed Air," June 1904, Volume 9, Number 4, pages 2962 to 2976.

By Mr. HILLIARD.—I offer in evidence page 2975 and also page 2976 of this publication as New York Defendant's Exhibit No. 39.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to another article "Compressed Air Painting Machine." Please fix the date and describe the publication?

A. This is in "Compressed Air" January 1905, Volume 9, Number 11, page 3320.

By Mr. HILLIARD.—I offer a copy of this in evidence as New York Defendant's Exhibit No. 40.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to an article entitled "Ingenious [281] and Effective Air Lift Pump." Please tell us the name of the periodical, date, etc.?

A. This is in "Compressed Air," February 1905, Volume 9, Number 12, pages 3347 to 3349.

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—I offer in evidence a copy of pages 3347 to 3355 of this periodical as New York Defendant's Exhibit No. 41.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another article entitled "A New Method of Pumping Sand by Compressed Air." Tell us about that?

A. This is in "Compressed Air," December 1905, Volume 10, pages 3792 to 3795.

By Mr. HILLIARD.—I offer copy of these pages in evidence as New York Defendant's Exhibit No. 42.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I call your attention to another article in the same volume entitled "Air White Washer." Please tell us about that?

A. This is in "Compressed Air," February 1906. Volume 10, Number 12, page 3897.

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 43.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. Will you refer to the publication "Compressed Air" for 1903, page 2572, and the article therein entitled "Track Tamping with Air Blast" and state the volume in which that occurs? [282]

A. This is in "Compressed Air," September 1903, Volume 8, Number 7.

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 44.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. In the same volume, what issue does the matter on pages 2930 and 2331 appear?

A. April 1903, number 2.

By Mr. HILLIARD.—I also offer this in evidence as New York Defendant's Exhibit No. 45.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you an article entitled "Ballast Injector." Will you please tell us where this article appears, date, etc.?

A. In "Compressed Air" June 1897, Volume 2, Number 4, page 234.

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 46.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another volume and call attention to the item "Amond the Notes Descriptive." Will you please name the periodical this appears in, the date, etc.?

A. This is in "Compressed Air" June 1898, Volume 1, Number 4, page 3.

By Mr. HILLIARD.—I offer this in evidence as New York Defendant's Exhibit No. 47.

By Mr. WUPPER.—Same objections. [283]

(By Mr. HILLIARD.)

Q. I show you volume headed Chapter XIII en-

(Deposition of Julian A. Sohon.)

titled "Pneumatic Elevators and Conveyors." What is that volume, date, etc.?

A. This is a book by George Frederick Zimmer entitled "The Mechanical Handling of Material." It was published in 1905 by D. Van Nostrand Company, New York, pages 107 to 116.

By Mr. HILLIARD.—This article including the cut and pages 107 to 116 are offered in evidence as New York Defendant's Exhibit No. 48.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer the following article entitled "Draining a Swamp by Air Lift" appearing at page 7759 of the Compressed Air Magazine for October 1915, Volume 20, Number 10, as New York Defendant's Exhibit No. 49.

By Mr. WUPPER.—Same objections, and also on the ground that the date of the publication is subsequent to the filing date of the patent in suit.

By Mr. HILLIARD.—I next offer in evidence pages 4490 and 4491 of "Compressed Air," June 1907, Volume 12, Number 4, as New York Defendant's Exhibit No. 50.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer in evidence as New York Defendant's Exhibit No. 51, pages 340, 341 and 342 of the "Engineering Record" of March 29, 1913, Volume 67, Number 13.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer in evidence as New York Defendant's Exhibit No. 52, the article in "Engineering News" October 11, 1906, Volume 55,

(Deposition of Julian A. Sohon.)

Number 15, entitled [284] "Grouting a leaking tunnel on the Paris, Lyons and Mediterranean Ry." appearing on pages 374 and 375.

By Mr. WUPPER.—Same objections except as to priority of alleged date.

(By Mr. HILLIARD.)

Q. In connection with the last article, I offer as New York Defendant's Exhibit No. 53, an article in original French, with duly certified translation thereof appearing in "Revue Generale des Chemins de Fer et des Tramways." I will ask Mr. Sohon to continue with description.

A. This article is in Volume XXIX, 1906, Number 1, pages 529 to 539.

By Mr. WUPPER.—Same objections to the publication in the French language and to the translation. The translation will be subject to correction when actually produced.

By Mr. HILLIARD.—I offer the translation of this French article as New York Defendant's Exhibit No. 54.

By Mr. HILLIARD.—I next offer in evidence as New York Defendant's Exhibit No. 55, pages 580, 581 and 582 of the "Engineering News," November 25, 1909, entitled "Lining and Grouting a French Railway Tunnel in Water Bearing Material."

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 56, the original article in French on this subject from "Revue Generale des Chemins de Fer," March 1909, 22d year, first

(Deposition of Julian A. Sohon.)

part, number 3, pages 167 to 179 and offer as Exhibits pages 171, 172, 173 and 174. [285]

By Mr. WUPPER.—Same objections as to other French publication with the additional objection that it lacks priority.

By Mr. HILLIARD.—I offer in evidence as New York Defendant's Exhibit No. 57, translation of same.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. You have before you a German publication. Will you please tell what it is, its date and the article to which the book is opened?

A. The title of this article is "Die Trockenlegung nasser Tunnelgewolbe and Widerlager" by F. A. Gelbcke. This is in the periodical "Centralblatt der Bauverwaltung," February 21, 1891, pages 73 to 75; February 28, 1891, pages 84 and 85, Volume XI, Numbers 8 and 9.

Q. Is this publication one of general circulation in this line of work? A. Yes.

By Mr. HILLIARD.—This article is offered in evidence as New York Defendant's Exhibit No. 58, and the translation of same is offered in evidence as New York Defendant's Exhibit No. 59.

By Mr. WUPPER.—Same objections as made with reference to the other two French publications and their translations. It is understood that copies of the translations are to be furnished at the same time that the photostatic copies are furnished, is it not?

(Deposition of Julian A. Sohon.)

By Mr. HILLIARD.—Yes.

(By Mr. HILLIARD.)

A. Just refer to the next German publication before you [286] on page 1756 and state the name of the publication, date, and so on?

A. The publication is "Zeitschrift des Vereines Deutscher Ingenieure," December 7, 1901, Volume XLV, Number 49.

By Mr. HILLIARD.—I offer the original in German on page 1756 and 1757 of the article just referred to as New York Defendant's Exhibit No. 60, and also, as New York Defendant's Exhibit No. 61, a translation of so much of said article as relates to the conveyance of material by means of compressed air.

By Mr. WUPPER.—Same objection as made to the last German Article and its translation.

(By Mr. HILLIARD.)

Q. What is this German article before you now?

A. The title of this article is "Wiederherstellung schadhafter Bauweke mittels Einpressens flussigen Zements" by A. Wolfsholz. It is in "Zentrallblatt der Vauverwaltung," October 17, 1903, 23d year, number 83, pages 517 and 518.

By Mr. HILLIARD.—This article in the original is offered in evidence as New York Defendant's Exhibit No. 62, and a translation thereof as New York Defendant's Exhibit No. 63.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you an article appearing in the French

(Deposition of Julian A. Sohon.)

publication and ask you to identify and describe it?

A. The title of this article is "Elevation directe des liquides par l'air comprime" by E. Lemaire. It is in the periodical "Le Genie Civil" of March 19, 1904, [287] Volume XLIV, Number 20, pages 314 to 317.

By Mr. HILLIARD.—This article is offered in evidence as New York Defendant's Exhibit No. 64, pages 314 to 317, inclusive, and a translation thereof is offered as New York Defendant's Exhibit No. 65.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

I show you an article in German entitled "Zeitschrift des Vereines deutscher Ingenieure" dated July 16, 1904, Volume XLVIII, Number 29, pages 1080 and 1801 and ask you to identify that article?

A. This article is by Mr. Wittrock and is on the use of compressed air for raising liquids.

By Mr. HILLIARD.—The article is offered in evidence as New York Defendant's Exhibit No. 66 and a translation thereof as New York Defendant's Exhibit No. 67.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. I show you another article in German and ask you to identify it?

A. The title of this article is "Verfahren zur Ausfuhrung von Arbeiten in Wasserfuhrenden order lockern Gebirgschichten." It is the periodical

(Deposition of Julian A. Sohon.)

"Gluckauf" February 16, 1907, Volume XLIII, pages 202 and 203.

By Mr. HILLIARD.—The original of this article is offered in evidence as New York Defendant's Exhibit No. 68, and a translation thereof is offered in evidence as New York Defendant's Exhibit No. 69.

By Mr. WUPPER.—Same objections and also objection of nonpriority. [288]

(By Mr. HILLIARD.)

Q. Are these foreign publications that you have been referring to books or periodicals or publications of general circulation and reference?

A. They are.

(By Mr. HILLIARD.)

Q. I show you a volume in French entitled "Emploi d'injections de ciment, a l'air comprime, dans les maconneries, terrains de fondations, etc."?

A. The article is in the French periodical "Genie Civil" December 29, 1900, Volume XXXVIII, Number 9, page 145.

By Mr. HILLIARD.—I offer page 145 of this article as New York Defendant's Exhibit No. 76 and I offer as New York Defendant's Exhibit No. 77, the translation of same.

By Mr. WUPPER.—Same objections as to other articles in foreign languages and the translations thereof.

(By Mr. HILLIARD.)

Q. I show you another article in French in the

(Deposition of Julian A. Sohon.)

same journal entitled "Fondations au moyen de l'air comprime experiences de M. Hersant." Can you identify this publication and the article?

A. This is in "Le Genie Civil" September 21, 1895, Volume XXVII, Number 21, pages 327 to 329. The author is L. A. Barbet.

By Mr. HILLIARD.—I offer page 327 of the journal last referred to as New York Defendant's Exhibit No. 78 and the translation of same as New York Defendant's Exhibit No. 79.

By Mr. WUPPER.—Same objections as to other French articles [289] and their translations.

(By Mr. HILLIARD.)

Q. Will you stipulate that the Canniff Patent No. 873,345, New York Defendant's Exhibit No. 83, was subsequent to its issue on December 10, 1907, licensed to the Ransom Concrete Machinery Company to which we have referred heretofore, and that the Ransom Company paid substantial royalties under that patent up to the time of its expiration?

A. I am willing to stipulate that the Ransom Company is reputed to be a licensee of the plaintiff.

By Mr. WUPPER.—I do not have personal knowledge of the license referred to but will stipulate with the defendant's counsel that the Ransom Concrete Machinery Company for a number of years prior to the expiration of the Canniff patent in question was a licensee under that patent for the manufacture of grouting machines in accordance therewith, and was, at the same time, a licensee

under the McMichael Patent in suit for the manufacture of concrete conveying and placing machines.

By Mr. HILLIARD.—I herewith offer pages 35 and 36 of the "Engineering News," January 9, 1902, Volume XLVII, part 2, and especially the article entitled "A Three Hinged Concrete Arch Bridge over the Danube at Ehingen" as New York Defendant's Exhibit No. 104.

By Mr. WUPPER.—Objected to as irrelevant and immaterial and not the best evidence of any date or fact of publication or of any statement therein contained.

By Mr. HILLIARD.—I next offer page 113 of "Engineering News" February 6, 1902, Volume XLVII, Number 6, and particularly [290] the article "Forming foundations in sand or gravel by injecting cement grout" and ask that the same be marked New York Defendant's Exhibit No. 105.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 106 the article entitled "Improved method of constructing foundation under water by forcing cement into loose sand or gravel by means of air pressure" by F. Neukirch, Bremen, Germany, appearing in the transactions of the American Society of Civil Engineers, Volume XXIX, of September, 1893, pages 639 to 643 inclusive, together with plate No. 1 illustrating the article.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 109 pages 579 to 583 of Transactions of The American Society of Civil Engineers, Volume XXX, December 1893, article entitled "Subaqueous foundations" discussions on paper 623, by C. O. Glein and F. Neukirch.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 110 pages 329, 330, and 331 of the "Engineering Board of March 12, 1904, article entitled "The New York and Brooklyn Tunnel for the Rapid Transit Railroad" and illustrations thereof.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 111 pages 375 to 385 inclusive, being page XXXI of the book entitled "Popular Handbook for Cement and Concrete Users" by Myron H. Lewis and Albert H. Chandler, [291] published by the Norman W. Henly Publishing Company, New York, 1911, chapter entitled "Grout, or Liquid Concrete and its Users."

By Mr. WUPPER.—Same objection, also that the date of the alleged publication is subsequent to the filing date of the patent in suit.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 112 an article from the "Engineering Record" for March 4, 1905, pages 232 to 235, inclusive, entitled "Gravity Tunnel for the New Water Works of Cincinnati," by J. A. Hiller.

By Mr. WUPPER.—Same objections except for nonpriority of alleged date.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 113 pages 6006 and 6007 of "Compressed Air Magazine" for April 1911, Volume XVI, Number 4, article entitled "Pneumatic Muck Ejector with two stage air supply" with illustration.

By Mr. WUPPER.—Same objections including objections for nonpriority of alleged date.

By Mr. HILLIARD.—I next offer as New York Defendant's Exhibit No. 114, pages 220 and 221 of the "Engineering News" for March 7, 1891, Volume XXV, Number 10, article entitled "A cofferdam or caisson without timber or iron in its construction."

By Mr. WUPPER.—Same objections except objection for lack of priority of alleged date.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 115, pages 163 of the Engineering News of September 12, 1895, Volume XXXIV, Number 11, the article entitled [292] "A new method for securing foundations."

By Mr. WUPPER.—Same objections except as to lack of priority of alleged date.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 116 an article in French in "LeGene Civil" page 237 of September 21, 1895, Volume XXVII, Number 21, article entitled "Fondations au moyen de L'Air Comprime," by

(Deposition of Julian A. Sohon.)

L. A. Barbet, and the translation of this page 527 as New York Defendant's Exhibit No. 117.

By Mr. WUPPER.—Same objections as to the other French publications and their translations.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 118 an article in the original French in "Le Genie Civil" page 145 of December 29, 1900, Volume XXXVIII, Number 9, article entitled "Emploi d'injections de ciment, a l'air comprime dans les maconnories, terrains de fondations, etc." and the translation of same as New York Defendant's Exhibit No. 119.

By Mr. WUPPER.—Same objections.

(By Mr. HILLIARD.)

Q. Will you please identify pages 10 and 11 of this publication which I show you?

A. This publication is entitled "Construction capacity and cost of operating dredging machines of several types in recent excavations of large magnitude." The author is John Bogart. This paper is communication No. 3 in section 3 of the IX International Navigation Congress and the date of the publication is 1902.

By Mr. HILLIARD.—I offer pages 10 and 11, also title page of this publication as New York Defendant's Exhibit No. 120. [293]

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 121, the full page illustration appearing opposite page 378 of the Engineering News for June 13, 1895, which illustration is entitled

"The Hussey Deliverying Dredge" together with description thereof on pages 379 and 380.

By Mr. WUPPER.—Same objections as to other American Publications.

By Mr. HILLIARD.—Also in the same volume of "Engineering News" for June 13, 1895, I offer the article appearing on pages 384, 385 and 386 and 387 entitled "The handling of dredged material" as New York Defendant's Exhibit No. 122.

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 123, pages 2, 3 and 4 of the "Engineering Record" of January 6, 1900, article entitled "The St. Lawrence Power Plant."

By Mr. WUPPER.—Same objections.

By Mr. HILLIARD.—I offer as New York Defendant's Exhibit No. 124, pages 70 and 71 of article entitled "Hains on Reclamation of Potomac Flats" appearing in the "Transactions of the American Society of Civil Engineers," Volume XXXI of January, 1894.

By Mr. WUPPER.—Some objections.

By Mr. HILLIARD.—In the same book pages 492 and 493, I offer as New York Defendant's Exhibit No. 125 the article entitled "Dredging Operations" being a discussion of the preceding paper, in Volume XXXI, dated May, 1894. [294]

By Mr. WUPPER.—Same objections.

(Deposition of Julian A. Sohon.)

Cross-examination.

(By Mr. WUPPER.)

Q. I think you testified before that all statements concerning dates of publications or articles referred to and produced in connection with your testimony are based solely on the fact that they are found in the Library here and bear the dates mentioned?

A. Yes.

Q. How long have you been employed in your present occupation by the Engineering Societies Library? A. Seven years.

2 P. M. Tuesday, September 6th, met pursuant to adjournment:

ADDITIONAL APPEARANCE.

Mr. STEPHEN J. COX, of New York City, for Plaintiff.

By Mr. HILLIARD.—I wish to notify the plaintiff's counsel that Robert A. Shailer, a material witness for the defense herein, is now in Europe and I am reliably informed that he will not be in New York until the middle of September and that therefore proper proceedings will be taken by the defendant's counsel to secure his testimony and have it introduced into the case on behalf of the defendant.

By Mr. COX.—The materiality of Mr. Shailer's testimony is not conceded and the reservation which defendant's counsel attempts to make is not consented to. [295]

DEPOSITION OF JAMES McILVRID, FOR DEFENDANT.

JAMES McILVRID, defendant's witness, whose deposition was taken at New York City on September 6, 1927.

My name is James McIlvrid; I am 61 years of age and reside at 42 Armstrong Ave., Jersey City; I am a master mechanic. I have followed the mechanical line of work since 1891. I am a son of William McIlvrid to whom a patent was issued on May 7, 1910, No. 958,421, on an application filed November 2, 1905, for a grout mixer. My father died between eight and nine years ago. I am familiar with the machine shown and described in the patent mentioned. It was known as a grout mixer.

(Note: Patent offered by defendant's counsel as New York Defendant's Exhibit No. 97.)

Q. Were any machines ever manufactured according to this patent? A. Yes, sir.

By Mr. COX.—One moment. The question is objected to because it calls for an interpretation of the patent [296] by the witness and has not been shown that it is the intent to make such an interpretation.

(By Mr. HILLIARD.)

Q. Are you familiar with drawings of the machine? A. Yes, sir.

Q. You have used them a great deal?

A. Yes, sir, all my life.

(Deposition of James McIlvrid.)

Q. And you are familiar with specifications of the machine? A. Yes, sir.

Q. You have used them all your life?

A. Yes, sir.

Q. What was your first knowledge of this machine that you testified about, the grout mixer, and by whom was it manufactured?

A. Manufactured by the Cockburn Barrow Machine Company first.

Q. And your position there was what?

A. Foreman machinist when I started there.

Q. And that was when? A. 1906.

Q. How long did you continue as foreman of the plant?

A. About ten years,—as foreman you mean?

Q. Yes? A. One year.

Q. And after that? A. Superintendent.

Q. When did you go to work there?

A. In the fall of 1906.

Q. Were they manufacturing these grout mixers that you testified about when you went there?

A. They were. [297]

Q. Was there any time during that period when you weren't manufacturing or when not prepared to manufacture these grout machines?

A. No, we were always prepared to manufacture them.

Q. Can you estimate the probable number of them that you manufactured during the ten years you were there, just an estimate?

(Deposition of James McIlvrid.)

A. I should say *15p* or 200 machines.

Q. And were all these machines sold?

A. Yes, sir, every one of them.

Q. Do you know whether they were used?

A. Yes, sir, they were used.

Q. Have you any record showing the type of these machines being manufactured when you went to the work there in 1906? A. No record.

Q. Have you any drawings showing them?

A. Only the ones you have there on file.

Q. You refer to these blue-prints that I exhibit to you marked 1-109-D and 1-110-D?

A. Right, I do.

Q. Do these blue-prints correctly show the construction of the grout mixers made by this concern in 1906? A. Yes, they do.

By Mr. HILLIARD.—I will ask to have these blue-prints temporarily marked for identification, that which bears the date January 30, 1904, being marked the New York Defendant's Exhibit No. 98 for identification and that bearing the date February 9, 1904, being marked New York Defendant's Exhibit No. 99 for identification. [298]

Q. I notice on these drawings under the dates the initials H. C. L. Who is H. C. L.?

A. He was chief draftsman.

Q. What was his name?

A. Harry C. LePorte.

Q. How long have you known Mr. LePorte?

A. Since 1906.

(Deposition of James McIlvrid.)

Q. Was he connected with the Cockburn Barrow Company when you went there?

A. He was.

Q. In what capacity? A. Chief draftsman.

Q. Do you know what these drawings show, and if so just briefly state what the two drawings are?

A. The drawings show the plans of hydraulic grout mixers 21x36.

Q. Was that what was known as the "Standard 21"? A. Yes, sir.

Q. What general differences are there between these two drawings?

A. One is 21x36 and the other 21x22 has a shorter body.

Q. Which represents the larger machine?

A. The 21x36.

Q. And this is the one which is marked Exhibit No. 98 for identification?

A. Yes, that is the one, No. 98.

Q. Did you get out any catalogues in which this machine was illustrated or were there any catalogues at the plant illustrating them when you got there? [299]

A. Yes there was a little brown catalogue that sort of illustrated them.

Q. I show you a catalogue bearing the name Cockburn Barrow Machine Company and designated thereon as Catalogue "C" and ask you what you know about it?

A. The only thing I know is that it is the Cock-

(Deposition of James McIlvrid.)

burn Barrow Company catalogue and shows cuts of the various machines they manufactured.

Q. Was that catalogue in existence before you went there in 1906? A. Yes, sir.

Q. Does it illustrate either of the machines shown in the drawings of 1904 and identified here as New York Defendant's Exhibits No. 98 and No. 99 for identification?

A. This one doesn't show the grout mixer at all. (Upon inspection it was found that pages 7 to 18 inclusive of this catalogue were missing.)

Q. Were these concrete mixers known under any general trade name?

A. Cockburn Grout Mixers is all I ever knew them by.

Q. Have you ever heard the expression "Cockburn & Barrow Mixers"?

A. The Cockburn and Barrow Mxers, yes.

Q. Did you put out any other mixers of any sort or were any being put out at the time you went to work there?

A. Not when I went to work there. There was only the standard grout mixer manufactured but we afterward built the larger one with the larger discharge.

Q. How long did you continue with the Cockburn Barrow Company? [300]

A. About twelve years.

Q. And did it always retain that name?

A. No—Cockburn Barrow Machine Company,

(Deposition of James McIlvrid.)

the Cockburn McIlvrid Company and the Standard Gas Power Company.

Q. What became of the Standard Gas Power Company?

A. Just petered out, that was all.

Q. Do you know who purchased its assets?

A. No, the building was purchased by the Marine Supply Company of Jersey City.

Q. Do you know whether they sold it to anybody?

A. They sold the building to the Ault and Waborg Company, ink manufacturers.

Q. Are these grout mixers as made by the Cockburn Barrow Company being manufactured to-day?

A. Yes, sir.

Q. By whom? A. By the Union Iron Works.

Q. Where are they located? A. Hoboken.

(Direct examination closed.)

Cross-examination.

(By Mr. COX.)

Q. Are you familiar with the construction of the grout mixers being made to-day by the Union Iron Works? A. No.

Q. Do you know how long the Union Iron Works have been making grout mixers?

A. I judge in the neighborhood of twelve years.

Q. The grout mixer made by the Union Iron Works is a vertical machine without blades or paddles in it. Do you [301] know that? A. No.

Q. Do you now recall when the Cockburn Barrow Company failed?

(Deposition of James McIlvrid.)

A. The Cockburn Barrow Company didn't fail, the old partners died and they just turned it into another company.

Q. What was the name of the other company?

A. Cockburn McIlvrid.

Q. When did that concern fail?

A. I don't know as any of them failed. I think the Standard Gas Power was the only one that failed.

Q. Don't you recall that the Cockburn Barrow Company went into the hands of a receiver?

A. Yes, I do. My father was receiver.

Q. And about when was that?

A. That must have been about fifteen years ago.

Q. That would be about 1912?

A. Yes, I judge about that.

Q. In your deposition given in the case of Concrete Mixing and Conveying Company against Stone and Webster Incorporated in June of the present year, did you not testify as follows:

"Q. When did the Cockburn Barrow Company fail?

A. I don't know just what year it was.

Q. Well, about what year?

A. Let's see, I think it was about 1914.

Q. You think it was about 1914?

A. Yes." [302]

I show you copy of your deposition?

A. Well, I would say now it was in that neighborhood. I can't tell you just exactly when it was.

By Mr. COX.—Answer is objected to as not responsive.

(Deposition of James McIlvrid.)

Q. Did you or did you not so testify?

A. I did.

By Mr. COX.—That is all.

Redirect Examination.

(By Mr. HILLIARD.)

Q. I show you a photostat of certain machines bearing the legend Defendant's Exhibit No. 100, page 16, and ask you whether or not that is a copy of a page that was found in the Cockburn Barrow, catalogue "C" that you have just testified about?

A. Yes, sir, it is an exact copy of the original.

Q. Does this page that you have just referred to illustrate either of the machines shown in the drawings of 1904 which you have identified as New York Defendant's Exhibits No. 98 and No. 99 for identification?

A. It only shows the end view and the side elevation of the standard machine.

Q. What do the code words at the bottom of this photostat indicate?

A. Indicates the size of the machine.

Q. Does this photostat represent the products that were being manufactured by Cockburn Barrow up to the time you went to work for them in the fall of 1906? A. Yes, sir.

By Mr. HILLIARD.—I offer in evidence the catalogue "C" of [303] the Cockburn Barrow Machine Company as New York Defendant's Exhibit No. 100 and the copy of page 16 that has just been referred to as New York Defendant's Exhibit No. 100–A.

(Deposition of Harry C. LePorte.)

By Mr. COX.—Let me see that, will you? You mean the pictures?

By Mr. HILLIARD.—Yes.

By Mr. COX.—Objected to as wholly immaterial and irrelevant. [304]

DEPOSITION OF HARRY C. LePORTE, FOR DEFENDANT.

HARRY C. LePORTE, defendant's witness, whose deposition was taken at New York City on September 7, 1927.

My name is Harry C. LePorte; I am 52 years of age; residence, Mountain View, New Jersey; occupation, mechanical engineer.

I am connected with the Union Iron Works, Hoboken, New Jersey; I have been connected with that concern nearly ten years. Immediately prior to being connected with the Union Iron Works I was with the Dover Boiler Works, Dover, New Jersey, H. B. Arden, Engineer. We were engaged in private propositions. Atkins Filter Press Corporation, they were in New York City, and prior to that with the Cockburn Barrow Machine Company and their successors, they being under four different corporate names while I was with them. These names were The Cockburn Barrow Company, the Cockburn McIlvrid Corporation and the Standard Gas Power Corporation.

I was with the General Chemical Company for one year. I first went to work for the Cockburn Barrow Company in 1903, either in August or Sep-

(Deposition of Harry C. LePorte.)

tember. They were located out in 11th St., Jersey City, between Cowes and Erie Streets. I was associated with the Cockburn Barrow Company first as draftsman, latter as chief draftsman, engineer, assistant works manager.

I was entirely familiar with the machinery which the Cockburn Barrow Company was making. They made so-called grout mixers. My first knowledge of that grout mixer was as follows: I was handed by Mr. McIlvrid, who was manager at the time, some rough pencil sketches showing the idea, and in a sketchy way the construction desired, and told to put in shape for construction. I put it in shape for construction by making drawings. The first machines were built on sketches. After one or two had been constructed and we found the construction and operation satisfactory enough, we made detailed drawings. I can't state exactly when the first machine of this description was made, but late in 1903 or very early in 1904. [305]

The machine consisted essentially of a steel plate cylinder—steel plate horizontal cylinder—with a shaft running through the cylinder longitudinally carrying paddles for the mixing of the material. The shaft passing through stuffing boxes on the heads of the machine to prevent air leakage. There was a dome mounted on the top of the cylinder and an opening in the top of the dome for filling the machine. When it was desired to eject the material from the machine the door in the top of the charging dome was closed, then compressed air ad-

(Deposition of Harry C. LePorte.)

mitted to the cylinder through a pipe opening close to the top of the cylinder. This air pressure forces the door of the charging dome against its seat giving a tight seal against leakage of air. The air pressure acting on the surface of the material in the cylinder forced the material out through the discharge pipe which entered the cylinder at the bottom—at the bottom of one of the heads—and forced the material to the right location through a hose connected with this outlet pipe just mentioned.

The shaft which carried the paddles was located in the cylinder longitudinally on the center line of the cylinder, that is on the axis. The standard size of the air pipe for admission of air to the cylinder was, I think, one-inch, the standard size of the outlet pipe was two inches. [306]

Q. I show you a blue-print which is marked New York Defendant's Exhibit No. 98 for Identification, and ask you to state what you know about that blue-print?

A. That's a print from the original tracing made on this grout mixer.

Q. Did you make the original tracing?

A. I did.

Q. How does it happen that this Exhibit No. 98 marked for identification, bear the name Union Iron Works?

A. The old Cockburn Barrow Company being out of business, the Union Iron Works tried this machine along with several other products of the Cockburn Company, and the drawings and patterns

(Deposition of Harry C. LePorte.)

used in this machine were acquired by the Union Iron Works after which they erased the old Cockburn Barrow Company name and inserted their own on the face of it. It can be seen by close inspection of the print that the Union Iron Works is lettered in over an erasure. The old letters showing faintly on the print.

Q. When was the original of this blue-print, Exhibit No. 98 for Identification, made? [307]

A. This is the original tracing. It is dated January 30, 1904. It was made about that time. It's barely possible that the drawing may have been antedated a little but not at a date previous to construction of machines. There is in the Engineering Record of March 12, 1904, an article regarding the subway tunnel in which appears a description and cut of this machine. That assembly drawing we have before us was originally made for use in connection with that article, very shortly before the publication of that article which as I stated was in March 1904.

Q. I further show you a blue-print marked New York Defendant's Exhibit No. 99 for Identifications, and ask you what you know about that blue-print?

A. Well, the statements that I have made regarding the other print would apply to this one absolutely, the only difference being that this is a little smaller machine, the cylinder being 22 inches long instead of 36 inches.

Q. This is the short one? A. Yes.

(Deposition of Harry C. LePorte.)

Q. Are these two blue-prints which I have just shown you, are they present day working drawings of the Union Iron Works?

A. In all essential detail. There have been various changes from time to time, changes we considered cheapened the manufacture a little, gave readier access to certain parts which required renewal from time to time, also some changes which afforded a longer life to certain wearing parts.

By Mr. WUPPER.—Objected to as not responsive and voluntary. [308]

(By Mr. HILLIARD.)

Q. Are you willing to allow the original drawings to pass out of your own possession?

A. The original drawings are in the files of the Union Iron Works and they would retain those as part of their record.

Q. Are they willing to allow them to leave their possession and go to California?

A. They are not.

By Mr. HILLIARD.—I offer in evidence the two blue-prints New York Defendant's Exhibits No. 98 and No. 99 for Identification, as New York Defendant's Exhibit No. 98 and No. 99 respectively.

By Mr. WUPPER.—Objected to as immaterial and irrelevant.

(By Mr. HILLIARD.)

Q. Do you know whether any catalogue was published by the Cockburn Barrow Company illustrating and advertising these grout mixers?

(Deposition of Harry C. LePorte.)

A. There was.

Q. Can you produce one?

A. There is a copy here from my personal files known as catalogue "C."

Q. Do you know when this catalogue was first published?

A. I will have to study a little before giving a definite answer to this question.

Q. Take your time and answer it.

A. It was published about 1906, I should judge about 1906, I know it was about that time.

By Mr. HILLIARD.—I offer the catalogue produced by the witness in evidence as New York Defendant's Exhibit [309] No. 100–B.

By Mr. WUPPER.—Objected to as incompetent, irrelevant and immaterial.

(By Mr. HILLIARD.)

Q. Is the grout mixer shown in New York Defendant's Exhibits No. 98 and No. 99, which are the two blue-prints illustrated in this catalogue?

A. The same machine shown on page 16 of the catalogue.

Q. Is the air inlet shown in that catalogue?

A. Yes, in the lower left-hand view. The pipe shown at the upper part of the cylinder is the air inlet.

Q. Will you mark the air inlet with the words "Air Inlet"? A. Witness complies.

Q. Is the grout outlet shown on page 16 of the catalogue?

(Deposition of Harry C. LePorte.)

A. It is in the same view at the lower part of the cylinder.

Q. And will you mark that "Grout Outlet"?

A. Witness complies.

Q. Are all those three views on page 16 of the catalogue this same machine? A. They are.

Q. You have referred to having made some of these grout machines or of some of them having been made before the drawings New York Defendant's Exhibits No. 98 and No. 99—that is the blue-prints were made—did you make other machines like this after that?

A. Do you mean the same machine?

Q. Yes, after the blue-prints were made?

A. We made a great many of them.

Q. Did you make any in 1905 and 1906?

A. Yes, that was about the time when the business on these [310] machines was most active.

Q. Does the Union Iron Works make them today? A. They do.

Q. Has the Union Iron Works any catalogues illustrating these grout mixers? A. They have.

Q. Is this Bulletin 63 that I show you one of them?

A. It is. Figures 38 and 39 in this Bulletin 63 of the Union Iron Works show the same machine with the constructional modifications which I have referred to previously.

Q. Will you read the printed matter on the pages showing figures 38 and 39 and state whether or not

(Deposition of Harry C. LePorte.)

the statements of this printed matter are true and correct?

(Appearance—Mr. Stephen J. Cox, of New York City, for Plaintiff.)

A. (Witness reading.) I believe every statement there to be absolutely correct.

By Mr. COX.—The question and answer are objected to as obviously incompetent because relating to matters beyond the knowledge of the witness. They are also objected to as irrelevant and immaterial.

(By Mr. HILLIARD.)

Q. Is your position with the Union Iron Works such as to make you familiar with the specifications of the grout mixers found in figures 38 and 39? A. It is.

Q. And with the mode of operation of such grout mixers? A. It is.

Q. Does knowledge of these things that I have asked you about pertain to your duties in the Union Iron Works? A. They do. [311]

Q. To what extent is it necessary for you to understand the practical operation of this machine?

A. You mean to what extent in my business connection with the Union Iron Works?

Q. Yes.

A. Why, as I stated before I made the original drawings of the machine in 1904 for the Cockburn Barrows Machine Company, practically all the constructional changes and modifications since that date have been either made personally or super-

(Deposition of Harry C. LePorte.)

vised by me. I am thoroughly familiar with the machine in all its detail, in fact I am in charge of the engineering work of the Union Iron Works.

Q. I notice here that it says that the mixing drum of the grout mixer in figures 38 and 39 is 21 inches diameter by 36 in length. Are those inside or outside dimensions? A. Inside.

Q. I notice that the weight is given as 1350 pounds. What does that represent?

A. Total weight of the machine with skids and engine for driving the machine.

Q. Do you know the approximate weight of the engine? A. I think about 180 pounds complete.

By Mr. HILLIARD.—I offer this catalogue, "Bulletin 63" of the Union Iron Works and particularly the page bearing figures 38 and 39 in evidence as New York Defendant's Exhibit No. 101.

By Mr. COX.—Objected to as immaterial and irrelevant and incompetent, and in support of this objection the copyright date of the Exhibit—1926—is noted. [312]

(By Mr. HILLIARD.)

Q. Now, referring to this Cockburn Barrow Mrchine Company catalogue "C" which is Defendant's Exhibit No. 100–B, do you know whether or not the machine shown on page 16 was ever built for mixing and ejecting anything besides grout?

A. (Witness examines catalogue "C.") We at one time made on special order one of those machines, standard size and construction, except that the grout outlet pipe was a larger size to permit

(Deposition of Harry C. LePorte.)

the passage of stones, the user using it for ejecting concrete instead of grout mixture which the machine was designed for.

By Mr. COX.—Objected to as largely incompetent and mere hearsay.

(By Mr. HILLIARD.)

Q. You know that that machine was actually built of your own knowledge? A. It was.

Q. You saw it made? A. I did.

Q. Do you recall what the size of the outlet on that machine was?

A. It was either 2½ or 3 inch pipe size.

Q. Was that same order for this special machine ever duplicated?

A. Not duplicated, but we received a successive order for a machine of exactly the same type and construction in somewhat larger size from the same customer.

Q. In this Cockburn Barrow catalogue "C," Defendant's Exhibit No. 100–B, there is illustrated and described on pages 12 and 13 a concrete mixer style "B." Did [313] you make such machines or were such machines being made when you went there?

A. Yes, they, the Cockburn Company, had been engaged in the manufacture of that machine for some years before my engagement with them and continued to build them to some extent after I was engaged with them.

Q. Do you know whether the machine shown on page 16 of New York Defendant's Exhibit No.

(Deposition of Harry C. LePorte.)

100-B and in the drawings, New York Defendant's Exhibits No. 98 and No. 99, which are the blueprints, was ever patented?

A. It was—the patent was issued to William McIlvrid.

Q. Do you recognize the patent before you do number 958,421—particularly the drawings?

A. That is the same machine regarding which I have been testifying.

Q. You are referring to McIlvrid patent 958,421, are you? A. I am.

Q. I understood you to say that many of these Cockburn Barrow mixers were built and put into use. Do you recall any special big order?

A. One from the O'Rourke Engineering Construction Company shortly after they started construction of the Pennsylvania Railroad Tunnel. That order was for 24 machines.

Q. Do you remember when they were used?

A. I should judge the latter part of 1905 or early in 1906.

Q. Were those machines that were sold to the O'Rourke Engineering & Construction Company used over any considerable period of time on the Pennsylvania Tunnels?

A. They were used during the entire construction of the tunnel. [314]

Q. Did you personally see them used there?

A. I did a number of times.

Q. I show you a page which has plate 41 in the Transactions of the American Society of Civil En-

(Deposition of Harry C. LePorte.)

gineers, Volume LXVIII, number 1155, September, 1910, and ask if there is anything shown in that page that you recognize?

A. This grout mixer to which my testimony refers is shown here very clearly.

Q. Is that a Cockburn Barrow Grout Mixer?

A. It was.

Q. Which figure in that page do you refer to?

A. The lower one.

Q. What does that illustration indicate is taking place?

A. It is evident that they are engaged in discharging the machine at the time the picture was taken.

Q. Where is the material being introduced?

A. It is being introduced through a grouting hole which is provided in the cast iron lining plates for the purpose.

Q. What grouting conduit or connection is there between this grouting hole and pipe and the tunnel pipe and the mixer?

A. As shown here, a hose connection.

Q. Where is the hose connection?

A. The hose is shown at the left of the operator who is introducing the hose nozzle into the grouting hole of the lining plate. Also as shown, curves round back of the operator and appears again next to the outlet pipe of the machine.

By Mr. HILLIARD.—I offer in evidence a photostat copy of the page of the Translations of the American Society [315] of Civil Engineers

(Deposition of Harry C. LePorte.)

which has just been referred to as New York Defendant's Exhibit No. 103.

By Mr. HILLIARD.—That is all.

By Mr. COX.—It is noted that this photostat purports to be pages 256 and the following page of volume LXVIII, number 1155, September 1910, and the exhibit and all the testimony relating to it are objected to as not the best evidence, and as irrelevant and immaterial, and relating to something which occurred several years after the application for the patent in suit. This objection does not modify the stipulation heretofore made for the use of photostat copies.

Cross-examination.

(By Mr. COX.)

Q. Just where are you employed in the Union Iron Works—in what part of their plant?

A. Chiefly in the office.

Q. And what are your particular duties there?

A. Engineering work, designing, estimating, preparation of charts, drawings and checking subordinates, and also keeping a general eye on construction in the shop to see that the drawings are conformed to, that is a general check on the workshop foreman.

Q. What is the size of the plant of the Union Iron Works?

A. You mean the number of employees?

Q. And size of plant?

A. As nearly as I can judge the number of em-

(Deposition of Harry C. LePorte.)

ployees at the present time would be about fifty. The plant could accommodate 175 employees. Any more details desired?

Q. No, I think that's enough. And do you manufacture [316] the various articles enumerated on the cover of the catalogue which has been offered in evidence as Exhibit No. 101?

A. We do.

Q. Do you make anything else than these enumerated articles?

A. A great deal of special work to customers' drawings and specifications.

Q. That is to say, outside of your regular line, is that what you mean?

A. Well, outside of the standard articles enumerated in the catalogue. Of course we consider the special work for customers one of our regular lines.

Q. Are the books of the Cockburn Company prior to 1914 in existence? A. I don't know.

Q. You haven't been asked to look them up?

A. I have not.

Q. In June last when you gave your deposition in the suit of the Concrete Mixing and Conveying Company against Stone & Webster Incorporated, you stated that you were unable to recall who it was that ordered a machine like that shown in the blue-prints, Exhibits No. 98 and No. 99, with the 2½ or 3-inch discharge opening. Have you looked that up since?

A. There was no means by which I could look it up.

(Deposition of Harry C. LePorte.)

Q. Then you are unable to give us the name of the person who ordered that.

A. I am still unable to do so.

Q. You understand that they issued an order to the Cockburn [317] Barrow Machine Company. Are you able to give us the date of that order?

A. Not very accurately, but it must have been late in 1907 or early in 1908.

Q. In your former deposition given about three months ago, you gave the date as "The winter of 1908 or 1909 or the winter of 1909 or 1910," did you not? I show you copy of your testimony.

A. May I dream over that a minute?

Q. The question is whether you said that or not?

A. I assume from its appearing in the record that that is what I said at the time.

Q. Do you not remember that you gave that answer at that time?

A. No, I can't say—I remember answering the question—I could not state accurately what the dates were—it was simply a question of memory anyway.

Q. You have no doubt that you did so testify in your last deposition, have you?

A. No, I have no doubt that the record is correct.

Q. Then how do you know how to account for the difference in dates between your present testimony and your testimony three months back?

A. Possibly I answered the question to-day a little too quickly without stopping to consider sufficiently.

(Deposition of Harry C. LePorte.)

Q. You have no way of fixing that date?

A. Nothing except memory.

Q. Have you any way of fixing the date of the order for 24 grouters for use in the Pennsylvania Tunnel?

A. Not very closely. Of course, the date on which the [318] O'Rourke Engineering & Construction Company started to set tunnel lining rings could be determined. The use of the machines undoubtedly began at that date and the order placed with the Cockburn Company I remember was placed at amply sufficient time prior to the date they would start using them to allow for construction of the machines.

Q. Do you recall when the Pennsylvania Tunnel was completed, that is to say the lining of the tunnel? A. Do I recall the date when completed?

Q. Yes? A. I don't.

Q. Can you recall the year?

A. I don't think I better make any statement on that,—no, I have no accurate recollection of that.

Q. Now, when did the Cockburn Company fail?

A. They wound up their business—that is their successor, the Standard Gas Power Corporation—wound up their business in 1915.

Q. Well, when did the Cockburn Company pass into the hands of a receiver?

A. Either 1912 or 1913.

(Deposition of Harry C. LePorte.)

Q. In your said deposition given in June last you testified: "They passed into the hands of a receiver in I think 1911 and were succeeded by the Cockburn McIlvrid Corporation"—did you not? I show you your testimony.

A. That is my testimony, is it?

Q. Yes. The question is just whether you gave that testimony? A. That is my testimony. [319]

WITNESS.—Pardon me, may I correct that testimony on that point?

By Mr. COX.—Go right ahead; yes.

WITNESS.—I was figuring back before. The only way I could locate it was remembering where I lived the day they went into receivership and I was figuring back the length of time. I now make it 1911 after figuring with pencil and paper.

(By Mr. COX.)

Q. Now the Cockburn Company or at least its receiver effected a compromise with the creditors of the corporation during the receivership, did it not?

A. I couldn't say. The financial affairs were not my business, I'm an engineer.

Q. Did the Cockburn McIlvrid Corporation purchase the assets of the Cockburn Company from the receiver?

A. I know nothing about it except that they succeeded to the business of the Cockburn Company.

Q. The plant was closed down for a time, was it not? A. Not to my knowledge.

(Deposition of Harry C. LePorte.)

Q. Was it run by the receiver?

A. It was. It might be proper in view of the questions you are asking me now, to state that during the time the Cockburn Company was under the Cockburn Company organization I left the company and was engaged with the General Chemical Company in New York for one year. I returned to the Cochran McIlvrid Corporation after about one year, so that there were some matters during that year of which I have no knowledge. [320]

Q. Now the catalogues of the Cockburn Barrow Machine Company marked Exhibits No. 100 and No. 100–B both have missing pages, the first, pages 7 to 18 inclusive and the second, pages 7 and 8. Is that correct?

A. That seems to be correct. Regarding this catalogue marked 100–B that is from my own personal files this morning. I can testify that pages 7 and 8 have nothing whatever to do with grout mixers, concrete machinery or anything of the kind—they were wheel barrel pages.

By Mr. COX.—Answer objected to as not responsive and voluntary—and question repeated.

Q. Now the catalogues of the Cockburn Barrow Machine Company marked Exhibits No. 100 and No. 100–B both have missing pages, the first, pages 7 to 18 inclusive and the second, pages 7 and 8. Is that correct? A. It is.

Q. Can you give us the date of the publication of these catalogues marked Exhibits No. 100 and No. 100–B?

(Deposition of Harry C. LePorte.)

A. Not more accurately than what I have already testified to.

Q. Well just add the date, will you?

A. It was to the best of my recollection somewhere around 1906.

Q. On pages 12 to 15 inclusive of this catalogue there appear illustrations of concrete mixers (offering catalogue to witness). Did the Cockburn Company make mixers of that character?

A. (Witness examining catalogue.) They did.

Q. Just tell us briefly how these mixers operated?

A. The style "B" mixer illustrated on page 12, the essential features of the machine are the mixing box [321] at the rectangular cross-section shown, the charging hopper is shown in the upper cut on the left hand end of the machine. The mixing box revolves on the supporting rollers shown, carries the material over and up as it revolves and allows it to drop. There was a shaft running through the mixing box longitudinally carrying a worm at the left hand in the bottom of the charging hopper, the worm feeding the materials at the bottom of the charging hopper into the mixing box and this shaft also carried a few paddles which assisted in the mixing operation and assisted in feeding the material through the discharge end of the machine at the right. The distinctive feature of this machine was that it had a continuous mixer—the material being fed into the hopper, mixed and discharged continuously. The mixer shown on page 14 is merely a cylindrical

(Deposition of Harry C. LePorte.)

box with an opening in one side as shown, the material dumped into the box, the cover closed and clamped and the material mixed by revolving the box and opening the door turning the box over to bring the door opening low on one side and the material discharged from the box by turning it over slowly. It is a rather crude machine, but the phototype of some of the more efficient modern machines.

Q. How was the concrete discharged in the machine first described by you which was made by the Cockburn Company?

A. Simply by the material being fed in and passing through the mixer box forced the material along through the mixing box, the mixing box being set on a slight angle inclining downward towards the discharge end to assist in the feeding in that direction. [322]

Q. That is the concrete was discharged from both of these mixers made by the Cockburn Company by gravity, is that correct?

A. Gravity only. [323]

DEPOSITION OF CLINTON H. CROOKS, FOR DEFENDANT.

CLINTON H. CROOKS, defendant's witness, whose deposition was taken in New York City, September 7, 1927.

My name is Clinton H. Crooks; I am 46 years of age; my address is 609 West 137th St., New York City. I am a construction engineer with Rosoff

(Deposition of Clinton H. Crooks.)

Subway Construction Company, New York City. I have followed the engineering profession for 25 years. I am not a graduate of an engineering institute. I have had experience with grouting. After it was made we conveyed it to the place where it was to rest, where we desired to put it. My experience with the use of a compressed air in conveying grout dates from April, 1906, and it was used prior to that date on the same piece of work but I wasn't connected with it before that. The job to which I refer was known at that time as the Battery Tunnel, subway tunnel, from Bowling Green to Borough Hall, Brooklyn, Bowling Green being in Manhattan. It was a supaqueous tunnel under the East River. We utilized air pressure for placing the grout back of the east iron lining tubes. That was one use. It is standard practice on subaqueous work to use what we call a blow pipe for the removal of water in the heading or air chamber. That water and sand, small stones and stuff is conveyed out through the pipe of air by air pressure on the surface. You have a construction tunnel which is under air pressure and the minute you open your blow line anything near it if it is small enough will come out through the blow pipe.

The type of grout machine which I used on this job was a horizontal cylinder shaped machine with revolving paddles inside, the opening being on the top through a hole or hatch, the door of which was hinged inwardly. You opened the door, you

(Deposition of Clinton H. Crooks.)

dropped it, and let it hang vertically. After putting in your cement and water by raising the door and turning on the air [324] the air would hold the door tight, these paddles would revolve in the machine for mixing the grout and after a minute or two of mixing you opened up your valves and let the air pressure blow the grout out of the [325] machine through a flexible hose connection to what we called grout plugs in the cast-iron lining of the tunnel—blow the grout on the outside of the cast-iron lining. I think the manufacture of the machine that I used was Cockburn and Barrow, and I think Jersey City was their address.

Q. I show you catalogue "C" of the Cockburn Barrow Machine Company which is New York Defendant's Exhibit No. 100–B and call your attention to page 16. Does the illustration on page 16 show the machine which you used on that job?

A. (Witness examining same.) Yes, sir.

Q. In your work on the Battery Tunnel, did you ever have any other experience particularly with the operation of compressed air in conveying anything other than grout, water or muck or sand?

A. Yes, sir, we had an accident there in 1905, in which a man was blown up through the river bottom through the cover over the top of the tunnel and through the water above the cover on the top of the tunnel. He went through an approximate distance of about twelve feet of muck and about the same amount of water on top of it. He was picked up on the surface of the river by means

(Deposition of Clinton H. Crooks.)

of a rowboat. This occurred on the Brooklyn side some little distance out from the bulkhead. The tubes at that point were located between two piers. This man came up in the slip between the two piers.

By Mr. HILLIARD.—That is all.

By Mr. COX.—No cross-examination. [326]

OFFER OF EXHIBITS BY COUNSEL FOR DEFENDANT.

A certified copy of the file-wrapper and contents of McMichael patent No. 1,127,660 was admitted in evidence as Defendant's Exhibit 134.

A certified copy of the file-wrapper of the Leake patent No. 1,215,558, dated February 13, 1917, application filed October 7, 1907, was admitted in evidence, over the objection of plaintiffs' counsel that the exhibit was irrelevant and immaterial and was marked Defendant's Exhibit 135.

An assignment from the patentee Leake to the plaintiff was admitted in evidence over the objection of plaintiff's counsel that the exhibit was irrelevant and immaterial, as Defendant's Exhibit 136.

Counsel for defendant offered in evidence a certified copy of the file-wrapper of Buzzell and Larkin patent No. 951,754 and a certified copy of the file-wrapper of Buzzell and Larkin patent No. 894,813. Their admission in evidence was objected to by counsel for plaintiff on the ground that they are immaterial and irrelevant. The objection was

sustained, the file-wrappers were excluded from evidence and were marked for identification respectively, as Defendant's Exhibits 137 and 138. [327]

Mr. TOWNSEND.—Now, there was another interference that McMichael was involved in, and that was with one W. W. Darley, who filed his application December 30th, 1907; that interference I have here was between like subject matter, as the Patent Office held, and as a part of the *res gestae*—as a part of the co-pending application and as interpretative of the patent, I offer a certified copy of the file-wrapper and contents of this Darley application, and it is particularly pertinent in this, your Honor—

Mr. WILIAMS.—(Interrupting.) May I first interpose my objection?

The COURT.—This is all being tried through the Court and this all goes in anyhow in one form or another, and the Court will not consider it if there is an objection unless it is competent and material. What is the object of this?

Mr. TOWNSEND.—The object is this, for two things. There is a certified copy of the so-called preliminary statement of Leake claiming to be the inventor of the same subject matter that is involved here. The claims in here are directed to a so-called group machine. Darley has the same construction that Leake has. However, Darley's application was directed to the handling of a dry material, such as grain, and this is to show, your Honor, the analogy between the handling of ma-

terials wet and dry, and that it is the expression of the Patent Office experts that there was interfering subject matter. That is something that has never been brought out in any litigation and never has been developed, and it is essential that if this case goes further that the analogy between different devices for carrying away by [328] compressed air, independent of the particular use to which it is put should be shown. I offer this in evidence, your Honor, as Defendant's Exhibit 139.

Mr. WILLIAMS.— * * * I object to its receipt.

The COURT.—Sustained.

Mr. TOWNSEND.—Exception.

The COURT. — Exception allowed. Proceed. As far as the analogy is concerned, I suppose there are many of them of which judicial knowledge or judicial notice will be taken if they exist. Proceed.

(Whereupon certified copy of file-wrapper of Darley for patent marked Defendant's Exhibit 139 was denied in evidence.)

Mr. TOWNSEND.—I next offer a proof of patent, copies of which I have had certified, by reason of the fact that we were unable to make a stipulation with the other side that uncertified printed or photostatic copies could be offered, a stipulation which is so common in patent cases.

The first patent I offer as Defendant's Exhibit 140 is a patent by Smith, 122,497, January 2d, 1872. The next I offer as Exhibit 141, is a patent by Smith, No. 122,498, January 2, 1872.

* * * The third patent is that of Goodrich Exhibit 142, on a method of repairing tunnels. No. 317,337, May 5th, 1885—to show the state of the art.

The next is Goldie, Exhibit 143, on the use of a semititious (cementitious) mixture for blasting, No. 676,128, June 11, 1901. Exhibit 143 is Goldie's patent, 676,129, June 11, 1901. One is the method and the other is the apparatus. The last is Exhibit 144. [329] The next is 145, and that is Goldie's patent 707,840, August 26, 1902, which is a method and means of tamping railway tracks by compressed air using cement and cemititious (cementitious) mixtures. The first two patents of Goldie's are for wet mixtures. The third patent of Goldie is for a dry mixture. The next, Exhibit 146, which is Moir, improvement in apparatus for forcing lime grout, cement and the like, No. 778,878. That is January 3, 1905—a horizontal gun.

(Whereupon certified copy of Smith patent 122,497 dated Jan. 2, 1872, was admitted in evidence as Defendant's Exhibit 140; Certified copy of Smith patent Jan. 2, 1872, 122,498 was admitted in evidence as Defendant's Exhibit 141; Certified copy of Goodrich patent No. 317,337, May 5, 1885, was admitted in Evidence as Defendant's Exhibit 142; Certified copy of Goldie's patent No. 676,128, dated June 11, 1901, was admitted in evidence as Defendant's Exhibit 143; Goldie Patent No. 676,191 dated June 11, 1901 was admitted in evidence as Defendant's Exhibit 144; certified copy of Goldie patent 707,840, dated August 26, 1902, was admitted in

evidence as Defendant's Exhibit 145; and Moir patent No. 778,878, dated Jan. 3, 1905 was admitted in evidence as Defendant's Exhibit 146.)

Mr. TOWNSEND.—The next is a patent by Tucker. That is 147, and the patent number is 820,747, May 15, 1906, Method of and apparatus for lining tunnels with concrete. The next is the Williams and Brown Exhibit 148—

Mr. WILLIAMS.—May I inquire whether the Tucker is set up in the answer? It is my recollection that it is not.

Mr. TOWNSEND.—It may be that one or two of these are not noticed, in which case they are only received to show the state of the art.

Mr. WILLIAMS.—I object to their use, of course, for any other purpose.

The COURT.—Yes. [330]

(Whereupon Tucker patent, 820,747, May 15th, 1906, marked Defendant's Exhibit 147, and denied.)

Mr. TOWNSEND.—I started to offer exhibit 148, Williams & Brown, 829,903, Aug. 28, 1906, a machine for handling material for tunnel arch construction.

Mr. WILLIAMS.—I make the same objection to that patent. I think that is not set up and we have had no notice of it.

The COURT.—Sustained.

(Whereupon Williams & Brown patent 829,903, Aug. 28, 1906, was marked Defendant's Exhibit 148 and denied in evidence.)

Mr. TOWNSEND.—The next is Exhibit 149, patent to Canniff, No. 873,345, issued Dec. 10, 1907,

with the application filed October 29th, 1906. A certified copy of that file-wrapper and contents will establish the date of the application of Canniff to be a date prior to the McMichael patent—a prior invention—and that is a pneumatic grout and mixing and discharging apparatus. That is a substantial disclosure of everything that is in the plaintiff's patent.

(Whereupon Canniff patent No. 873,345 dated Dec. 10, 1907, was admitted in evidence and marked Defendant's Exhibit No. 149.)

The next is a certified copy of Buzzell and Larkin's patent, Exhibit 150, No. 894,813, dated August 4, 1908, for a concrete conveyor employing the compressed air method.

Mr. WILLIAMS.—If the Court please, I should like to object to the receipt of this last patent in evidence for several reasons.

Mr. TOWNSEND.—The patent could not be pleaded as a prior invention because it was not applied for. It could not be a prior publication, your Honor, nor a prior patent, [331] but if you will look on page 9, you will see "J. W. Buzzell, Boston, Massachusetts; East Orange, New Jersey, and elsewhere in the United States," and "W. J. Larkin, New Haven, Connecticut; at Laport, Ind., and elsewhere in the United States," and this file-wrapper and patent are essential to explain and show what the Buzzell and Larkin prior invention was. You appreciate, I am sure, the difference between prior invention and prior publication.

It was not a prior publication. It was not a prior patent because it was later—

The COURT.—(Interrupting.) Objection sustained to the last offer. Proceed.

(Whereupon certified copy of Buzzell and Larkin's patent was marked Defendant's Exhibit 150 and admission into evidence denied.)

Mr. WILLIAMS.—May I understand that the same objection applies to the Tucker and the Williams and Brown patents, neither of which was set up in the bill of particulars. I make the same objection on the same ground.

Mr. TOWNSEND.—I offered them to show the state of the art.

* * * * * * * * *

The COURT.—Speaking of the depositions, the different exhibits—whatever exhibits were introduced in the depositions will be received but not otherwise. Objection sustained.

Mr. TOWNSEND.—Those patents are offered to show the state of art.

The COURT.—I understand. Take your exception and proceed.

Mr. TOWNSEND.—The next is the patent to McIlvrid 958,421, May 17, 1910, on an application filed November 2d, 1905. That is exhibit 151 the prior invention date being [332] November 2d, 1905.

(Whereupon certified copy of McIlvrid patent No. 958,421, May 17, 1910, was admitted in evidence as Defendant's Exhibit 151.)

(Whereupon certified copy of Pohle patent No. 487,639 Dec. 6, 1892, was admitted in evidence as Defendant's Exhibit 152.)

(Whereupon Saunders' patent 597,023 dated Jan. 11, 1898, was admitted in evidence as Defendant's Exhibit 153.)

Mr. TOWNSEND.—Then the Whisler patent, Exhibit 154, No. 669,197, dated March 5, 1901.

Mr. WILLIAMS.—I make the same objection as to the Whisler patent, on the same ground.

The COURT.—That is not mentioned in the bill of particulars?

Mr. WILLIAMS.—No.

The COURT.—Sustained.

(Whereupon Whisler patent No. 669,192, dated March 5, 1901, was marked Defendant's Exhibit 154 and its admission denied.)

Mr. TOWNSEND.—In the mining of sulphur out of a large number of Frasch patents we offer simply two related patents, No. 799,642, dated Sept. 19, 1905, as Exhibit 155, and as exhibit 156,800,127, dated September 19th, 1905.

(Whereupon Frasch patent No. 799,642, dated Sept. 19, 1905, and Frasch patent No. 800,127, dated Dec. 19, 1905, were admitted in evidence as Defendant's Exhibit 155 and 156 respectively.)

Then patents on the dredging and the McMichael principle of treating a material not concrete but of the same consistency as concrete in a closed chamber by air on top and expelling jet.

(Whereupon Duckham patents 4,400, dated Dec. 18, 1875, and Duckham Patent 15,348, dated Dec. 14,

1885, were admitted in evidence as Defendant's Exhibits 157 and 158 respectively.) [333]

(Whereupon Sickles' patent 99,360 dated Feb. 1, 1870, was admitted in evidence as Defendant's Exhibit No. 159.)

(Whereupon Rix & Donahoo patent, 635,270 dated Oct. 17, 1899, was admitted in evidence as Defendant's Exhibit 160.)

(Whereupon Church patent No. 487,606, dated Dec. 6, 1892, was admitted in evidence as Defendant's Exhibit 161.)

Mr. TOWNSEND.—Then patent to Fisher will be Exhibit 162—Fisher Patent 584,864, of June 22, 1907.

Mr. WILLIAMS.—To which we object on the ground that it is too late and on the ground that it is not set up in the bill of particulars.

The COURT.—Sustained.

Mr. TOWNSEND.—We offer to show the state of the art, your Honor.

(Whereupon Fisher patent 584,864 dated June 22, 1907, was marked as Defendant's Exhibit 162 and its admission denied.)

(Whereupon patent of Frizell, 233,499 dated October 19, 1880, was admitted in evidence as Defendant's Exhibit 184.)

(Whereupon Harris patent 759,100, dated May 3, 1904, and Harris patent 814,601 dated March 6, 1906, were admitted in evidence as Defendant's Exhibits 164 and 165 respectively.)

(Whereupon Warren patent 671,302, dated April

2, 1901, was admitted in evidence as Defendant's Exhibit No. 166.)

(Whereupon Butler patent 660,946 dated October 30, 1900, was admitted in evidence as Defendant's Exhibit No. 167.)

(Whereupon Kolsche patent 18,394, dated October 16, 1881, was admitted in evidence as Defendant's Exhibit 168.)

(Whereupon Hussey patent No. 497,427, dated May 16, 1893, and Hussey Patent No. 526,530, of September 25, 1894, were admitted in evidence as Defendant's Exhibits 169 and 170 respectively.) [334]

Mr. TOWNSEND.—Of a closed receptacle type with air pressure on materials to be ejected, displacement by air pressure with ejector—is the Henning patent, exhibit 171, No. 609,744 of August 23, 1898.)

Mr. WILLIAMS.—To which we object upon the ground that it is not set up in the bill of particulars, nor, as I recall, in the answer.

The COURT.—If that is the situation, the objection will be sustained.

(Whereupon Henning Patent No. 609,744, of August 23, 1898, was marked for identification Defendant's Exhibit 171.) [335]

TESTIMONY OF JOSEPH C. ROWELL, FOR DEFENDANT.

JOSEPH C. ROWELL, defendant's witness.

My name is Joseph C. Rowell. My age is 74; my residence is Oakland, California, and according to

(Testimony of Joseph C. Rowell.)

the register of the University of California, I am Librarian Emeritus and University Archivist. I have been connected with the University of California's Library since July 1, 1875. I am entirely familiar with the records of the University. These records have been under my control. The Library has in the past, and particularly prior to 1906, kept its records of books received.

The books received by the University Library from 1875 to 1911 were entered in what we called "accession books," a series of folio volumes in which on the left leaf in the first column was a series of numbers like 300,000, 300,411, 300,412, 300,413—an accession of numbers. The second column gave the date of the receipt into the library. Then followed the name of the author. Then the title of the book and on the opposite page the place of publication, the date of printing, the color of the binding, the size of the book and the agent from whom we purchased it, and the price that was paid for it, and that gave a complete history of the book and how we got hold of it.

Until 1898 this work was done by me personally in my own handwriting. From about that time some assistant or clerk in the Library did it under my directions. [336]

Q. I show you a bound volume of photographic reproductions of various publications and I will ask you if you have examined those. I will ask you whether or not you have ascertained whether the

(Testimony of Joseph C. Rowell.)

originals or any of them are in the archives of the library of the University of California.

A. Yes, sir. Almost all of them are volumes in the University of California, and I have examined them personally and compared each photostat with the volume from which it was photographed and can testify that they are exact copies without addition, subtraction or amendation.

Q. Now, please take that and state if you know when the originals of these various publications were received at the University of California library?

A. No. 20 was received at the University in 1907.

Mr. WILLIAMS.—Could you give the date, if I may interrupt?

The WITNESS.—The date of that is October 20, 1906, from the "Engineering Record."

Mr. WILLIAMS.—No. 20—are they to be desig-dated— [337] may I ask counsel—by number?

Mr. TOWNSEND.—The same number by which they were offered by the witnesses in New York.

Mr. WILLIAMS.—I have the same objection—if later they are to be offered—I shall object now on the ground that the date is too late to be material.

Mr. TOWNSEND.—Well, your Honor, these publications were all offered in New York in connection with Mr. Sohon's deposition in regard to the Engineering Society's Library. It so happens that the Engineering Society's Library is in New York, where we could only obtain these things and make the searches to discover the art—they had not been

(Testimony of Joseph C. Rowell.)

received there or the library was not in existence at a time anterior to the art.

The COURT.—What is the object of this publication?

Mr. TOWNSEND.—It shows the art of conveying material by compressed air.

Mr. WILLIAMS.—The witness said that it was received in October, 1907.

The WITNESS.—Yes, sir.

Mr. WILLIAMS.—Months after the date of the McMichael application. It is too late.

Mr. TOWNSEND.—I don't think that he said that.

The COURT.—He said that it was received in 1907 and it was dated October 20, 1906.

Mr. TOWNSEND.—These are scientific publications.

The COURT.—I know, but what is the object of it if it is within two years of the application of the McMichael patent?

Mr. TOWNSEND.—It is prior to the McMichael [338] invention. These are offered to show the state of the art prior to the McMichael invention. We have been put to a tremendous expense to bring a witness here to prove things which anybody would stipulate.

The COURT.—When does that go from—the McMichael invention?

Mr. TOWNSEND.—From January 14, 1907.

Mr. WILLIAMS.—My objection, however, is that there is no evidence now of this publication being of

(Testimony of Joseph C. Rowell.)

a date earlier than the date when this witness knows of it, which he said was in 1907.

The COURT.—Very well, it will be received over objection. If it is competent, it will receive consideration; if not, it will be ignored.

(Whereupon the "Engineering Record" Volume 54, October 20, 1906 (pages 424 to 427 inclusive) was admitted in evidence as Defendant's Exhibit No. 20.)

The WITNESS.—No. 21 is an extract from the "Railroad Gazette," printed April 20, 1906, and received by us in 1906.

(Whereupon "Railroad Gazette" dated April 20, 1906, was admitted in evidence as Defendant's Exhibit No. 21.)

The WITNESS.—No. 22 is a photostatic copy of an article appearing in "Engineering Contracting" dated October 10, 1907, and received by us in 1908.

Mr. WILLIAMS.—We object to that.

Mr. TOWNSEND.—That particular thing is offered in explanation of and descriptive of the Florida operation, to which we have referred in the depositions. [339]

Mr. WILLIAMS.—If the Court please,—

The COURT.—Are you objecting?

Mr. WILLIAMS.—I am objecting.

The COURT.—Sustained.

Mr. TOWNSEND.—Objection.

(Whereupon "Engineering Contracting," dated October 10, 1907, was marked for identification Defendant's Exhibit No. 22 and its admission denied.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—No. 23, an article from the "Scientific American," May 18, 1907, received by us in 1907.

Mr. WILLIAMS.—I make the same objection. It is too late.

Mr. TOWNSEND.—For the same reason, it is explanatory of the Florida work—part of the *res gestae.*

The COURT.—Well, it seems to be before the date of your application.

Mr. WILLIAMS.—No, your Honor, it is later.

The COURT.—Sustained.

(Whereupon article from "Scientific American," May 18, 1907, was marked Defendant's Exhibit No. 23 and its admission in evidence denied.)

Mr. TOWNSEND.—Exception.

The WITNESS.—Exhibit No. 24 is an extract

(Whereupon extract from the "Railway Age" of April 19, 1907.

Mr. WILLIAMS.—I make the same objection.

The COURT.—Sustained.

Mr. TOWNSEND.—It relates to the same subject matter, your Honor. Florida work. [340]

(Whereupon extract from the "Railway Age" of April 19, 1907 was marked as Defendant's Exhibit 24 and its admission denied.)

The WITNESS.—Exhibit No. 25 is a reprint or a photostatic copy of the "Engineering News" of October 19th, 1905, received by us in 1907.

(Whereupon "Engineering News" dated Octo-

(Testimony of Joseph C. Rowell.)

ber 19, 1905, was admitted in evidence as Defendant's Exhibit No. 25.)

The WITNESS.—A reprint from the proceedings —the transactions of the American Society of Civil Engineers received by us—I do not see the date on here but received by us in March, 1886. So that was before the time.

(Whereupon transactions of the American Society of Civil Engineers was admitted in evidence as Defendant's Exhibit No. 26.)

The WITNESS.—Exhibit No. 27, an extract from the same society's transactions, received by us in 1894.

(Transactions of the American Society of Civil Engineers admitted in evidence as Defendant's Exhibit No. 27.)

The WITNESS.—Exhibit No. 28, proceedings, I think of the same institution, received by us in May, 1896.

(Whereupon minutes of the proceedings of the Institution of Civil Engineers were admitted in evidence as Defendant's Exhibit No. 28.

The WITNESS.—Defendant's Exhibit No. 29 from the same proceedings, received by us in April, 1888. [341]

(Whereupon minutes of the proceedings of the Institution of Civil Engineers, was admitted in evidence as Defendant's Exhibit No. 29.)

The WITNESS.—Exhibit No. 30, received by us in September, 1896.

(Testimony of Joseph C. Rowell.)

(Minutes of the proceedings of the Institution of Civil Engineers admitted in evidence as Defendant's Exhibit No. 30.)

The WITNESS.—Exhibit No. 31, received by us in 1896.

(Whereupon minutes of the proceedings of the Institution of Civil Engineers were received in evidence as Defendant's Exhibit No. 31.)

The WITNESS.—Exhibit No. 32, received by us in 1918, but it was published in the transaction of the Institution of Naval Architects—that is an English Society—in March, 1898. The book did not actually come to our library until 1918.

Mr. WILLIAMS.—I think to that one I shall interpose the objection that the testimony of this witness does not establish a date earlier than 1918, and I object to it on that ground.

The WITNESS.—The date was on the paper itself.

The COURT.—Sustained.

(Whereupon transactions of the Institution of Naval Architects, were marked Defendant's Exhibit 32 and admission denied.)

The WITNESS.—Exhibit No. 48 received by us in 1916.

Mr. WILLIAMS.—I make the same objection to it. It [342] is too late.

The COURT.—Sustained.

(Whereupon book by George Frederick Zimmer, entitled "The Mechanical Handling of Material"

(Testimony of Joseph C. Rowell.)

was marked Defendant's No. 48, and admission denied.)

The WITNESS.—Exhibit 51, in the "Engineering Record," received by us in 1913; date of publications,—

Mr. WILLIAMS.—(Interrupting.) I make the same objection. It is too late.

The COURT.—Sustained.

The WITNESS.—The date of publication appears as photographed, March 29, 1913.

(Whereupon Engineering Record of March 29, 1913, was marked Defendant's Exhibit 51 and its admission denied.)

The WITNESS.—Exhibit 52 from the "Engineering News" received by us in 1906. The date of that is October 11, 1906.

(Whereupon "Engineering News" of October 11, 1906, was marked Defendant's Exhibit 52 and its admission denied.)

The WITNESS.—Exhibit 58, an extract from a German periodical, "Zentralblatt der Bauverwaltung" dated February 21, 1891, and received by us in 1903.

(Whereupon "Zentralblatt der Bauverwaltung" of February 21, 1891 was admitted in evidence as Defendant's Exhibit 58.)

The WITNESS.—Exhibit 59 is a translation of the same into the English language.

(Whereupon translation of Exhibit No. 58 was admitted in evidence as Defendant's No. 59.) [343]

(Testimony of Joseph C. Rowell.)

The WITNESS.—Exhibit No. 60 is a reprint from the German publication "Zeitschrift des Vereines deutscher Ingenieure." The date of the publication is—I do not know what it is, I have not got it noted down here, but we received it in 1901.

(Whereupon the German publication "Zeitschrift des Vereines deutscher Ingenieure" was admitted in evidence as Defendant's No. 60.)

The WITNESS.—Exhibit No. 61 is a translation into English of this article.

(Whereupon translation of Exhibit No. 60 was admitted in evidence as Defendant's No. 61.)

The WITNESS.—No. 62 is from a German publication "Zentrallblatt der Bauverwaltung." Dated October 17, 1903, and received by us in the same year, 1903.

(Whereupon German periodical "Zentrallblatt der Bauverwaltung" of October 17, 1903, was admitted in evidence as Defendant's Exhibit No. 62.)

The WITNESS.—Exhibit No. 63 is a translation into English of this article.

(Whereupon translation of Exhibit No. 62 was admitted in evidence as Defendant's Exhibit No. 63.)

The WITNESS.—Exhibit No. 64 is an article appearing in the French journal, "Le Genie Civil." Civil Engineer, I suppose that is. The date of that—it does not appear on the thing, but we received it in 1904.

(Whereupon article from the French journal

(Testimony of Joseph C. Rowell.)

"Le Genie Civil" was admitted in evidence as Defendant's Exhibit No. 64.)

The WITNESS.—Exhibit 65 is a translation into [344] English of this same article.

(Whereupon translation into English of Exhibit No. 64 was admitted in evidence as Defendant's Exhibit No. 65.)

The WITNESS.—Exhibit No. 66 is another French article—I mean a German article. It is from the minutes of the meeting of the Cologne Section of the Union of German Engineers, and that took place February 10, 1904. This particular book was received by the library in 1904.

(Whereupon minutes of the meeting of the Cologne section of the Union of German Engineers February 10, 1904, were admitted in evidence as Defendant's Exhibit No. 66.)

The WITNESS.—Exhibit No. 67 is a translation into English of this same article.

(Whereupon translation of Exhibit No. 66 was admitted in evidence as Defendant's Exhibit No. 67.)

The WITNESS.—Exhibit No. 68 is a German periodical called "Gluckauf"—all one word. The date of that is February 16, 1907, and it was received by our library the same year, 1907.

Mr. WILLIAMS.—I object to that one on the ground that it is too late.

The COURT.—Sustained.

(Testimony of Joseph C. Rowell.)

(Whereupon the German periodical "Gluckauf" February 16, 1907, was marked Defendant's Exhibit No. 68 and its admission denied.)

The WITNESS.—Exhibit 69 is a translation into English of the same article. [345]

Mr. WILLIAMS.—I make the same objection.

(Whereupon translation of Defendant's Exhibit No. 68 was marked Defendant's No. 69 and its admission denied.)

The WITNESS.—An article from the Engineering News dated November 25, 1909, received by the library in 1909.

Mr. WILLIAMS.—I make the same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—That it is too late.

The WITNESS.—Exhibit No. 80 was the—

Mr. WILLIAMS.—(Interrupting.) Was the last one may I ask, 79?

The COURT.—70, it must be.

The WITNESS.—Article from the "Engineering News" dated November 25, 1909, that is number 71.

Mr. TOWNSEND.—That is a description of the machine by Buzzell and Larkin.

(Whereupon article from "Engineering News," dated November 25, 1909, was marked Defendant's Exhibit No. 71 and its admission denied.)

The WITNESS.—Then exhibit No. 80, that is McKnight—that is Knights' American Mechanical Dictionary—from the Knights' Mechanical American Dictionary, received by the library in 1914.

(Testimony of Joseph C. Rowell.)

Mr. WILLIAMS.—I make the same objection as too late.

Mr. TOWNSEND.—Just a minute, your Honor, That Knight's Mechanical Dictionary is a book that you know as well as I do, and the original of that book I have had for over twenty-five years, and if you want me to [346] take the stand to prove its publication—it is a book issued in 1883, a standard text-book—I have had this particular book for twenty-five years.

The COURT.—Produce it. Objection sustained to this since it is made.

(Whereupon Knights' Mechanical American Dictionary was marked Defendant's Exhibit 80 and its admission denied.)

The WITNESS.—Exhibit 82—it is not in our University library.

Mr. TOWNSEND.—Just pass that.

The WITNESS.—Exhibit No. 83, "Engineering Record" of June 8, 1907, received by us in 1907.

Mr. WILLIAMS.—I make the objection that it is too late.

The COURT.—Sustained.

(Whereupon "Engineering Record" of June 8, 1907, was marked Defendant's Exhibit No. 83 and its admission denied.)

Mr. WILLIAMS.—I shall withdraw my objection to Knight's Mechanical Dictionary, because I don't want to be captious, but as the witness is testifying, we cannot know what he is talking about except by number. We will check that up later,

(Testimony of Joseph C. Rowell.)

but if what he refers to as having been received in 1914 is Knight's Mechanical Dictionary of a date—that is, published at a date prior to 1907, I am willing to withdraw my objections as to that item.

Mr. TOWNSEND.—I brought the volume with me.

Mr. WILLIAMS.—You won't need to leave it here as far as I am concerned. [347]

(Whereupon Defendant's Exhibit No. 80 was admitted in evidence.)

The COURT.—Proceed.

The WITNESS.—Exhibit 103, transactions of the American Society of Civil Engineers, received by us in October, 1910.

Mr. WILLIAMS.—I object to that on the ground that it is too late.

The COURT.—Yes.

Mr. TOWNSEND.—It is descriptive of the McIllvrid machine.

The COURT.—Sustained.

(Whereupon transactions of the American Society of Civil Engineers were marked Defendant's Exhibit 103 and its admission denied.)

The WITNESS.—Exhibit 105 is from the "Engineering News" of February 6, 1902, received by us in 1902.

(Whereupon "Engineering News," February 6, 1902, was admitted in evidence as Defendant's Exhibit No. 105.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—Exhibit No. 106 from the transactions of the American Society of Civil Engineers—what is this date? It is so small. I would like to have both counsel see that. My eyesight is not very good.

Mr. TOWNSEND.—September 18, 1893, take a look at that.

Mr. WILLIAMS.—What is the date of its receipt, is that the date of its receipt?

Mr. TOWNSEND.—No, the date of publication.

Mr. WILLIAMS.—That is not important. 1893 I read [348] that.

The WITNESS.—1893 I read that. That was received by the University Library in 1893.

(Whereupon transactions of the American Society of Civil Engineers, September 1893, was admitted in evidence as Defendant's Exhibit No. 106.)

The WITNESS.—Exhibit No. 109 from the same Society's transactions, received by us in 1894.

(Whereupon transactions of the American Society of Civil Engineers of December, 1893, was admitted in evidence as Defendant's Exhibit No. 109.)

The WITNESS.—Exhibit No. 110, from the "Engineering Record" of March 12, 1904, received by us in 1904.

(Whereupon transactions of the "Engineering Record" of March 12, 1904, was admitted in evidence as Defendant's Exhibit No. 110.)

The WITNESS.—A "Popular Hand Book for

(Testimony of Joseph C. Rowell.)

Cement and Concrete Users," published in 1911, received by us in 1911.

Mr. WILLIAMS.—To that one I object on the ground that it is too late.

The CLERK.—May I inquire the number.

Mr. WILLIAMS.—What is the number, the Clerk asks?

The WITNESS.—No. 111. Exhibit No. 111.

(Whereupon "Popular Hand Book for Cement and Concrete Users" was marked Defendant's Exhibit 111 and its admission denied.)

The WITNESS.—Exhibit No. 112, from the "Engineering Record" of March 4, 1905. Received by us in 1905.

(Whereupon "Engineering Record" of March 4, 1905 was admitted [349] in evidence as Defendant's Exhibit No. 112.)

The WITNESS.—Exhibit No. 114, from the "Engineering News" of March 7, 1891, received by us in 1891. I put that on the second one instead of on the reverse of the first page. I put that on the second by turning over two leaves at once.

(Whereupon "Engineering News" of March 7, 1891 was admitted in evidence as Defendant's Exhibit No. 114.)

The WITNESS.—Exhibit 115, from the "Engineering News" of September 12, 1895, received by the University Library in 1895.

(Whereupon "Engineering News" of September 12, 1895 was admitted in evidence as Defendant's Exhibit No. 115.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—An article from "Le Genie Civil" received subsequent to 1895, but before 1900. I cannot exactly find out the exact date of the receipt of that for some reason or other.

(Whereupon "Le Genie Civil" of September 21, 1895, was admitted in evidence as Defendant's Exhibit 116.)

The WITNESS.—Exhibit No. 117 is a translation of this article.

(Whereupon the translation of Exhibit 116 was admitted in evidence as Defendant's Exhibit 117.)

The WITNESS.—Exhibit No. 118 from the "Le Genie Civil" received by us in 1901.

(Whereupon "Le Genie Civil" of December 29, 1900, was admitted in evidence as Defendant's Exhibit No. 118.) [350]

The WITNESS.—A translation of the same is exhibit 119.

(Whereupon translation of Exhibit No. 118 was admitted in evidence as Defendant's Exhibit No. 119.)

The WITNESS.—Exhibit No. 121. This is a plate taken from the supplement to the "Engineering News" of June 13th, 1895. Received by us in 1895. And certain texts belonging to the same article.

(Whereupon plate and text from "Engineering News" of June 13, 1895, were admitted in evidence as Defendant's Exhibit No. 121.)

The WITNESS.—Exhibit No. 122. "Engineering News" of June 13, 1895, received by us in 1895.

(Testimony of Joseph C. Rowell.)

(Whereupon "Engineering News" of June 13, 1895, was admitted in evidence as Defendant's Exhibit No. 122.)

The WITNESS.—Exhibit No. 123. From the "Engineering Record" of January 6, 1900. Received by us in 1900.

(Whereupon "Engineering Record" of January 6, 1900, was admitted in evidence as Defendant's Exhibit No. 123.)

The WITNESS.—Exhibit No. 124—your memorandum will show what that is from. Let me see. I have it, 124.

Mr. WILLIAMS.—Are you going to testify from something you know of your own knowledge?

The WITNESS.—Yes, that is to say, I have found the exact volume from which this photograph was taken and compared it as to date and everything about it so that it is absolutely accurate.

Mr. WILLIAMS.—I gather that you did not know about [351] this when you were going—

The WITNESS.—Well, I do not think that perhaps the name of the periodical is very essential, but I see from what it is. It is from the transactions of the American Society of Civil Engineers, Volume 31 of January, 1894, pages 70 and 71, received by us in April, 1898.

(Whereupon transactions of the American Society of Civil Engineers, of January, 1894, was admitted in evidence as Defendant's Exhibit No. 124.)

(Testimony of Joseph C. Rowell.)

The WITNESS.—The last exhibit is No. 125, from the same transaction, received by us in April, 1898—the same month.

(Whereupon transactions of the American Society of Civil Engineers, April, 1898, was admitted in evidence as Defendant's Exhibit No. 125.)

Q. Mr. Rowell, when you receive periodicals, what is your method of marking their accession?

A. It has not always been uniform. We have usually stamped the name of the library on the first page and perhaps on the plates, and had—in certain years we have stamped the date, also. But usually when these single numbers of periodicals come—suppose it is a weekly periodical, we have to wait until the end of that volume is complete and the title page and index have been received from the publisher and then we send it to the binder, so that the actual receipt in the library may be subsequent—as a bound volume. The actual receipt as a bound volume may follow a few weeks or a few months, or even if binding money is very scarce— [352]

The COURT.—(Interrupting.) I do not see that all this is essential.

The WITNESS.—Yes.

The COURT.—I do not think there is any question about these.

Mr. TOWNSEND.—Yes.

The COURT.—Anything further with this witness?

Mr. TOWNSEND.—Just a second.

(Testimony of Joseph C. Rowell.)

Q. You have come to Seattle especially for the purpose of giving the testimony you have given?

A. Yes, sir.

Q. And you have come at the expense of the defendants' haven't you? A. Yes, sir.

Mr. TOWNSEND.—That is all.

The COURT.—You may cross-inquire.

Cross-examination.

(By Mr. WILLIAMS.)

Q. Can you make translations of these German and French articles yourself?

A. Not sufficiently correct to be satisfactory.

Q. You don't—

A. (Interrupting.) I read German, French, Italian and Spanish—various languages—

Q. (Interrupting.) You do not pose as an interpreter for the purpose of vouching for the correctness of these interpretations?

A. Not entirely.

Q. Translations? [353] A. Not entirely.

Q. You do not assume the responsibility, then, for the correctness of them? A. No, sir.

Mr. WILLIAMS.—That is all.

Mr. TOWNSEND.—That is all.

Mr. TOWNSEND.—These exhibits are all in evidence, your Honor.

Mr. TOWNSEND.—They are in evidence in connection with the New York depositions. If not, I will offer them again, but they have all been offered and marked.

The COURT.—Proceed.

(Testimony of H. L. Terwilliger.)

The COURT.—Any objection?

Mr. WILLIAMS.—I should like the opportunity because the testimony has not given it, to examine these—to determine whether they are set up in the bill of particulars and if not to offer any objection upon that score.

The COURT.—They may be admitted now, and if you find any that are not in the bill of particulars bring it to the attention of the Court. Your next witness. [354]

TESTIMONY OF H. L. TERWILLIGER, FOR DEFENDANT.

H. L. TERWILLIGER, defendant's witness.

My name is H. L. Terwilliger; my age is 53 and I live at Palo Alto, California. I am district manager for the Ingersoll-Rand Company of San Francisco. The Ingersoll-Rand Company is in the compressor business—air compressors, that is, machinery that uses compressed air. I have been engaged in the business dealing with air compressors and air compressing apparatus since the fall of 1897. [355]

Q. What has been your experience in that connection since that time?

A. When I left college, Cornell University, I had a thesis on the testing of high pressures under compressed air in New York first made by the Ingersoll Sargeant Drill Company and when I got out of college I went to the shops of the Ingersoll Sargeant Drill Company, in 1897 and worked there one

(Testimony of H. L. Terwilliger.)

year. After that one year, later in the fall of 1898, I went to their New York office and worked in the capacity of engineer and later as a salesman, and later as assistant to the General Manager in the sales end. That was Mr. Saunders and in 1901 I went to Europe for five years for the same company and in 1906 I came back and about mid-year I came to San Francisco and went into the general machinery business, that company handling the Ingersoll-Rand line which was formed in the meantime, and I stayed in that capacity until 1915, and since that time I have been district manager for the Ingersoll-Rand Company at San Francisco.

Q. Did you graduate from Cornell University?

A. I did.

Q. With what degree?

A. Why, they gave me the mechanical engineering degree at that time.

Q. Have you any knowledge as to extent compressed air was used for transporting mobile substances, say, prior to 1900.

A. Prior to 1900?

Q. Yes. A. No, only what I read. [356]

Q. Well, what knowledge—what familiarity did you have with the subject of compressed air apparatus prior to 1900?

A. From the time I made my thesis test and somewhat before, 1897, I had occasion to read about compressed air a great deal and when I made those tests I had to study them, and after I went with the Ingersoll Rand Company, I received a magazine called "Compressed Air."

(Testimony of H. L. Terwilliger.)

Q. Well, were you familiar with the general state of development of compressed air apparatus prior to 1900? A. Well, yes.

Q. And did you continue to keep in touch with the general development of such apparatus thereafter? A. I did.

Q. Please compare the general conditions as respect the efficiency and operation of compressed air apparatus at a period around about 1900 and at a period of 1906 or 1907.

Mr. WILLIAMS.—I object to that question as being utterly immaterial and irrelevant.

The COURT.—What is the purpose?

Mr. LOFTUS.—The purpose, your Honor, is to show the general rapid development of compressed air apparatus during that period, as in answer to any contention by the plaintiff—

The COURT.—(Interrupting.) Well, you have shown it by your patents or publications that that is a fact. I cannot see where the witnesss is in any better position to testify about that. He can read, and the rest of us can read. The objection is sustained. [357]

Q. Can you state to what extent the—state whether or not there was any increase in the general growth or development of compressed air apparatus and the methods of its application during that period between 1900 and 1906?

Mr. WILLIAMS.—If the Court please, if this is of any possible significance, it is a matter not only of judicial knowledge, but universal knowledge. I object.

(Testimony of H. L. Terwilliger.)

The COURT.—Yes, sustained.

Q. Have you—you stated something about keeping in touch with the development of the compressed air field through magazines and the like, and I will ask you in that connection, what magazines you have read.

A. Well, I have read particularly—

Mr. WILLIAMS.—If the Court please, I think that is immaterial. If there is a publication let us have it.

The COURT.—Sustained.

Mr. LOFTUS.—This is preliminary, your Honor.

The COURT.—Sustained. Proceed with the examination of the witness.

Q. Are you familiar with the magazine called "Compressed Air"? A. I am.

Q. How long have you known of it.

Mr. WILLIAMS.—I object, your Honor. If the magazine has got something, prove the magazine and its state.

The COURT.—Sustained.

Mr. LOFTUS.—We are going to offer the magazine, your Honor, and I am just laying the foundation.

The COURT.—You do not need any foundation on that. [358] Proceed with it, if you have anything to offer in the way of publications.

Q. I show you a volume containing various parts of a magazine entitled "Compressed Air" and ask you if you are familiar with it? A. I am.

(Testimony of H. L. Terwilliger.)

Q. How long have you known it—known of it?

Mr. WILLIAMS.—I object, your Honor. The significant thing is, when was it published?

Mr. LOFTUS.—It is not of significance when it was published if this witness has known of it prior to the date of this patent in suit.

The COURT.—The magazine may have existed a thousand years and it may not be material to this patent. Objection sustained. Proceed.

Mr. LOFTUS.—If I can establish the date, there are certain parts we want to offer.

The COURT.—Proceed.

Mr. LOFTUS.—I would like to offer this volume, certain parts of this volume in evidence, and by this witness to prove the age of the magazine.

The COURT.—The magazine may have existed for years. Prove the date of your publication. If you have any purpose that you want to offer it for, prove the date of your publication.

Mr. LOFTUS.—I am offering this volume, your Honor, and by this witness propose to prove that it was in existence prior to 1907.

Mr. WILLIAMS.—I object to its receipt until it is properly identified. There is no identification and [359] it is incompetent.

The COURT.—Can you prove by this witness that these were published prior to 1907?

Mr. LOFTUS.—I am asking the questions.

The COURT.—I say, can you interrogate?

Mr. LOFTUS.—Yes.

The COURT.—Well, proceed to do it; not simply ask him how long the magazine is in existence.

(Testimony of H. L. Terwilliger.)

Mr. LOFTUS.—I am asking him how long he has known of the magazine.

The COURT.—That is not material. Proceed.

The WITNESS.—I have known of the magazine since 1897.

The COURT.—Proceed with your witness.

Q. When did you first see this volume to become familiar with it?

A. You mean the particular parts contained in that?

Q. Yes. A. About 1898,—1898.

The COURT.—Proceed.

Mr. LOFTUS.—I offer this volume in evidence. We will refer to certain parts contained in this volume, particularly page 294, Article entitled "Water Works at Dixon, Illinois." Article continuing over on page 295. Then on page 334, an article entitled, "Painting buildings by compressed Air." Then page 403, an article entitled "Compressed Air Dredgers for Gold Mining." Then page 496, "Pneumatic Painting Machinery"—for painting machines.

The CLERK.—That will be 172. [360]

Mr. WILLIAMS.—If the Court please, I would like to ask a preliminary question or two.

The COURT.—Very well, proceed.

(Questions by Mr. WILLIAMS.)

Q. Where did this book come from. Has it been in your possession for a long while?

A. Not mine. It has been in the company's possession. The Ingersoll-Rand Company.

(Testimony of H. L. Terwilliger.)

Q. I am not asking you that. When did it get into your hands, did you bring it here?

A. These particular books?

Q. Yes? A. They gave them to me.

Q. Who gave them to you? A. The attorneys.

Q. When? A. Within the last few days.

Q. Then all you know about this particular book is that a few days ago it was handed to you by these attorneys?

A. I know more—that I think it was probably two years ago that the San Francisco office of the company which I represent was asked to collect data and our publicity in New York, dug up this material and sent it out.

Q. Well, that is something that you do not personally know about, isn't it?

A. I know just what I stated.

Q. Well, that is all you know—that some publicity department is supposed to have dug it up and counsel handed it to you a few days ago and you come here and try to identify it? [361]

A. I have seen those magazines—

Q. (Interrupting.) You are answering my questions now, and you have answered them. I object on the ground that the volume is not sufficiently proven.

Mr. LOFTUS.—I asked the witness if he had carefully examined this volume.

The COURT.—Oh, yes, and he told you that it was simply collected recently and he saw it a few

(Testimony of H. L. Terwilliger.)

days ago. Objection sustained. Anything further with this witness.

Direct Examination (Continued).

(By Mr. LOFTUS.)

Q. Were you a reader of this compressed air magazine, and if so for what period of time?

A. I have been a constant reader of it since 1898.

Q. I ask you to refer to the articles that I have just mentioned in offering this volume, and state whether or not you recall reading those at or about the time of the date stated on each issue of that Compressed Air magazine contained in that volume.

A. Well, I began to read these in 1897—oh, we had these older numbers on file in the New York office of the Ingersoll-Sergeant Drill Company, and I have read them all.

Q. So that those articles that are marked there are articles which you read in the magazine known as "Compressed Air"?

A. They are "Compressed Air." [362]

Q. And were read by you at about what date?

A. I read these when I went with the Ingersoll-Sergeant Drill Company in 1898 and *1988*,—that is when I went to their New York office.

Mr. LOFTUS.—I submit that the witness has properly identified these as to date anterior to 1907 and I renew the offer.

The COURT.—Admitted.

(Whereupon volume called "Compressed Air" magazine at pages 294 and 295, 334, 403 and 496 of said volume admitted in evidence as Defendant's Exhibit No. 172.)

(Testimony of H. L. Terwilliger.)

The COURT.—Proceed. Anything further with this witness?

Q. Similarly with respect to this volume 8 of "Compressed Air" containing the various issues of that magazine between March, 1903, and February, 1904, I call your attention to the following articles, one on page 2329, "Sand Blast cleaning of Structural Steel," another on page 2529 entitled "Compressed Air Pump for Painting" and another on page 2566 entitled "Compressed Air in the elevation of Tailings," another on page 2629 entitled "Developing the Air Compressor," another on page 2723 entitled "Raising Water with Compressed Air," and I ask you to refer to those articles and state whether or not you saw those articles in the magazine between the dates mentioned, namely, March, 1903, and February, 1904, or otherwise.

Mr. WILLIAMS.—Objection. I think that the introduction of this material has reached a point where [363] any objection that can be made ought to be made. The pertinency—the thing that is of significance is the date of the publication of this stuff. This witness is not asked about that. The question does not tend to prove the facts in that regard, and I object on the ground that the evidence called for is immaterial and irrelevant. Now, here we have got hundreds and hundreds and hundreds of pages of this stuff and if there is any way to protect—to protect Court and counsel I am going to do it, and I make that rather technical objection.

(Testimony of H. L. Terwilliger.)

The COURT.—Sustained. Proceed.

(Whereupon volume of "Compressed Air" from March 1903, to February, 1904, was marked Defendant's Exhibit 174 and its admissibility denied.)

Q. I hand you a volume entitled "Compressed Air Information" by Saunders and I ask you if you are familiar with that and when you first saw a volume of that edition.

Mr. WILLIAMS.—I make the same objection.

The COURT.—Sustained.

Mr. LOFTUS.—This volume is pleaded, your Honor,—

The COURT.—The Court has ruled. Proceed. Take your exception and subside.

Mr. LOFTUS.—Exception. Nothing further.

Mr. WILLIAMS.—No cross-examination.

Mr. LOFTUS.—I will have these marked for the purpose of the record.

(Witness excused.)

Whereupon an adjournment was taken at five o'clock, Sept. 13, 1927, to ten o'clock A. M., September 14, 1927. [364]

September 14th, 1927, 10:00 o'clock A. M.

Court convened pursuant to adjournment.

All parties present.

Mr. WILLIAMS.—If the Court please, I should like to introduce an objection to the receipt in evidence of the papers referred to yesterday as exhibit 111, "Popular Handbook for Cement or Concrete Uses" on the ground that it is not set up in the defendant's bill of particulars. The same objection

to the receipt in evidence of two patents, one Smith, No. 122,497, and another one—I think it was given as Goodrich 333,887. I have not seen any memorandum of that in the answer or anywhere and I may not have the name right, but that is as I have got it.

Mr. TOWNSEND.—That is to show the state of the art.

The COURT.—What exhibits are there?

Mr. WILLIAMS.—These are exhibits offered yesterday by the defendant.

The COURT.—Oh, well, if you do not give me the number I certainly will not find them for you.

Mr. WILLIAMS.—One is Smith patent 112,497.

The COURT.—The number of the exhibit. I do not propose to search like a needle in a haystack and relieve you of the labor. What is the number of one of the exhbits?

Mr. WILLIAMS.—The number of one of the exhibits is 111 and the numbers of those patents—may I see if I can find them— [365]

The COURT.—(Interrupting.) We will not wait for you. You will have to find that some other time.

Mr. WILLIAMS.—If the Court please, the exhibits, of course have not been available to us until this moment.

The COURT.—You will have to find it some other time. I will not wait for you here to do the work in court. Call your next witness.

Mr. TOWNSEND—In regard to one of the exhibits, a page from Knights' Mechanical Dictionary on Pneumatic caisson work, I believe counsel has withdrawn their objection to that. This book has been in my possession for over twenty-five years, and if I aim to take the stand I will prove it.

The COURT.—Proceed with your case.

Mr. TOWNSEND.—Do you stipulate—do you withdraw your objection?

Mr. WILLIAMS.—If the Court please, I withdraw my objection yesterday as to this particular Knights' Dictionary.

Mr. TOWNSEND.—Very well, I did not understand you. I omitted to offer two exhibits in connection with the eastern depositions. One is a certified copy of the Canniff file-wrapper, No. 873,345 and the other is a certified copy of the McIllvrid patent 958,421. Those file-wrappers are offered to prove the date of the filing as constituting prior invention. In the absence of a stipulation that we asked in regard to unprinted copies of the patent, U. S. in form, and the acknowledgment of dates of filing as being correct, being denied us, we have offered certified copies of patents, we have offered certified copies of [366] the file-wrappers and in order to prove the date of the invention I might say that the patent was issued later than the McMichael patent, but applied for earlier and we have, according to law, furnished certified copies of them.

So I offer them now, and they will be marked their respective numbers 66, and 102 in connection with the New York depositions.

Mr. WILLIAMS.—I object to receipt in record of the Canniff file-wrapper upon the ground that it was not set up as a prior invention in the defendant's bill of particulars.

Mr. TOWNSEND.—I beg your pardon, you are incorrect. McIlvrid and Canniff have been pleaded from the start.

Mr. WILLIAMS.—We do not find them in the bill of particulars filed. Then, furthermore, I object to the receipt in evidence of all of these—I guess there are hundreds and hundreds of pages of file-wrappers most of which constitute correspondence back and forth between parties not parties to this record—that is, between these applicants and the Patent Office. If there is any materiality in any part of the papers it is confined purely to the applications as filed and the drawings as filed. So I object to the receipt in evidence of anything more than the original specifications and the accompanying drawings. I make my objection on that ground as to both of them.

As to the Canniff file-wrapper, I make the further [367] objection that it is not set up in the bill of particulars.

Mr. TOWNSEND.—I take issue with counsel. The Canniff patent is set out on page 3 and the McIlvrid patent is set out on the same page—yes, the same page. Both of those patents are there.

Mr. WILLIAMS.—Well, if the Court please, I have not objected to the receipt in evidence of their patents on that score because their patents are so set out. Counsel is not now offering these, as he states, to prove prior publication. We concede that they are published later and as patents they are too late. He brings them forward to show that they are prior inventions. There is a list of sixty or eighty prior inventions contained in the bill of particulars and neither of these is so included.

The COURT.—Have these been set out in any deposition heretofore taken?

Mr. TOWNSEND.—Yes. The prior invention of McIlvrid is testified to by Sohon in New York and appears in the New York depositions.

The COURT.—Does the patent show the date of application?

Mr. TOWNSEND.—The patent shows the date of application, but that is not self-proving, and by offering the file-wrappers they carry the invention back at least to as early as the date of the application, and the Supreme Court has recently stated in the Woodenville case that an invention, when the date of application is proven, relates back at least to that. [368]

The COURT.—Isn't that proven in the patent itself?

Mr. TOWNSEND.—Not in the patent itself—not under the law.

The COURT.—I think every patent has an application.

Mr. TOWNSEND.—It has, sir but it is not a proof of the filing on that date. So I had to take the precaution of using this somewhat circuitous method of proving that date.

The COURT.—The objection is that you have not pleaded—that you have not set out in your bill of particulars these things.

Mr. TOWNSEND.—The Supreme Court has said that when you can prove the date of the application, that shows the invention as of that date.

Mr. WILLIAMS—No question about that, but it is not pleaded. This is not my point. My point is that it is not pleaded.

Mr. TOWNSEND.—Well, it is pleaded—

Mr. WILLIAMS.—It is not specified there.

Mr. TOWNSEND.—If we plead it once we plead it and use it for all purposes.

The COURT.—Let me see the bill of particulars.

Mr. TOWNSEND—That is on page three, your Honor. The Canniff patent and the McIlvrid patent, both. I set out the filing date there, and this is to prove the filing date.

The COURT.—Well, in so far as to prove the Canniff filing date, it will be admitted.

Mr. WILLIAMS.—Now, if the Court please I wonder [369] if the Court and counsel would accept my stipulatian that the filing date of these patents is the date appearing upon the respective

(Testimony of T. J. McCormick.)

patents and thus obviate getting two or three hundred pages into this record.

The COURT.—You admit it?

Mr. WILLIAMS.—I do admit it. May we then have these papers excluded on that stipulation?

Mr. TOWNSEND.—It may be instructive in some other respect.

The COURT.—They will be excluded. We have too much in this case now.

Mr. TOWNSEND.—Your Honor, I ask that these be marked for identification, if I may.

The COURT.—They may be.

(Whereupon certified copy of Canniff file-wrapper 873,345 and certified copy of McIlvrid file-wrapper, 958,421 were marked Defendant's Exhibits 82 and 102 respectively, and their admission denied.) [370]

TESTIMONY OF T. J. McCORMICK, FOR DEFENDANT.

T. J. McCORMICK, defendant's witness.

I am 65 years of age; my name is T. J. McCormick; I live at 7073 Greenwood Ave., Brooklyn, New York, and I am a construction engineer—New York subway. I have had 30 years' experience and training along the lines of subway and tunnel work in both Boston and New York. I have had experience in the transportation of materials such as cement and concrete by compressed air. My first experience in the use of compressed air for such

(Testimony of T. J. McCormick.)

work was in 1898. The machine used at that time was a grout machine made of pipe. I have a drawing of such a machine. I made the original drawing from which was made the enlargement which you show me. This is a drawing which I made for introduction in evidence in a case of this same plaintiff against Great Western Power Company and in the case of this plaintiff against Stone & Webster. This enlargement represents a machine which I used in 1898. The machine consisted of a 12-inch pipe with a coupling on both ends and a screw plug on the bottom of the T with an air jet on one end and an outlet on the other—a discharge line. [371]

Q. Where was the grout put in?

A. In here (indicating).

Q. At the top? A. Yes, sir.

Q. And then did you close the receptacle?

A. We put the plug in and opened it at this valve and turned on this one and blowed it out.

Q. Did you close the receptacle? A. Yes, sir.

Q. After you put it in? A. Yes, sir.

Q. And then the concrete was removed from the receptacle out? A. Yes, sir.

Mr. WILLIAMS.—I object to the question as leading. I think the witness ought to tell.

The COURT.—Yes.

Mr. TOWNSEND.—I am trying to—

Mr. WILLIAMS.—(Interrupting.) I know you are trying, [372] but I am objecting.

(Testimony of T. J. McCormick.)

The COURT.—Let him explain it. It probably explains itself.

Q. And to remove the grout from the receptacle, what did you do?

A. Opened the discharge line and turned on the air in the air plug.

Q. And in which position on the picture is the air plug—at the right?

A. At the left The discharge plug is at the right.

Q. And from that discharge plug how was the grout conveyed to its point of delivery?

A. By compressed air.

Q. By compressed air and through what sort of a channel. A. A pipe.

Q. Through a pipe? A. Yes, sir.

Q. Was that device used commercially?

A. Yes, sir.

Q. And have you any original drawings or the original apparatus of that machine?

A. No, sir.

Q. What became of the machine itself?

A. They were all destroyed.

Q. When next did you use a machine of that type? A. In 1902 and 1903.

Q. On what work was that?

A. In the east Boston tunnel.

Q. And how did it operate there?

A. Just the same way. Grouting leaks in the tunnel. [373]

(Testimony of T. J. McCormick.)

Q. Was any considerable amount of grout used in the east Boston tunnel? A. Yes, sir.

Q. A large quantity or a small quantity?

A. A very large quantity.

Q. Over a brief period or a long period?

A. A long period.

Q. How long? A. Three years.

Q. Who was the engineer in charge of that work?

A. R. A. Shailer.

Q. Is that Mr. Shailer the same gentleman who gave his deposition at the time you did, in June, in New York in this case? A. Yes, sir.

Q. Where is Mr. Shailer now?

A. He is in Europe.

Q. Now, when next did you use a machine like that or similar to that?

A. In 1905—1906 on the Belmont Tunnel in New York.

Q. How was that machine constructed and operated?

A. The same as the previous one in East Boston—the same as in other operations.

Q. Did you know Mr. Canniff? A. Yes, sir.

Q. Whose name has been mentioned in connection with certain facts here? A. Yes, sir.

Q. Did you ever operate or work with him?

A. He was the Master Mechanic under me in the Belmont tunnel. [374]

Q. Do you know anything about a patent that Mr. Canniff took out? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. Would you recognize a drawing of that device? A. Yes, sir.

Q. Of the Canniff device? A. Yes, sir.

Q. I show you an enlargement and ask you if you recognize that machine? A. Yes, sir.

Q. Did you ever see a machine of that sort in practical operation? A. Many of them.

Q. And when did you first see such a machine shown in the Canniff drawing or Canniff patent?

A. In 1905.

Q. Where was that?

A. In the Belmont tunnel.

Q. How did the operation of that machine compare with the machine shown in your original 1898 machine—with the operation shown in your original 1898 machine?

A. Practically the same.

Mr. TOWNSEND.—If your Honor please, I will offer the drawing of 1898, of the McCormick machine, as Defendant's Exhibit No. 175.

The COURT.—What machine is this?

Mr. TOWNSEND.—That is the original McCormick machine for shooting grout.

The COURT.—One that the witness testified to first? [375]

Mr. TOWNSEND.—Yes.

(Whereupon drawing of McCormick machine was admitted in evidence and marked Defendant's Exhibit 175.)

Q. Now, this Canniff machine, was that used extensively or otherwise? A. Very extensively.

(Testimony of T. J. McCormick.)

Q. And how long did you get the continued use of the Canniff machine?

A. From 1905—well, up to the present year,—1927.

Q. It has been in continuous use through all those years? A. Yes, sir.

Q. Now, have you ever used any other machine, prior to 1907 for depositing or placing grout or concrete by compressed air? A. Yes, sir.

Q. What machine was that?

A. We used two. We used the Greathead and the McIlvrid.

Q. What was the Greathead machine?

A. It was a cast iron, horizontal cylinder with an internal shaft, with paddles on it, agitating the grout and shooting it by compressed air.

Q. Where was the compressed air let in?

A. It was let in thru an opening on top of the cylinder and discharged through a pipe.

Q. And where was the discharge pipe?

A. On the bottom, the front end.

Q. The front end? A. Yes, sir.

Q. And how was the McIlvrid machine made and constructed [376] and operated?

A. It was practically the same thing, only it was a steel shell instead of a cast-iron shell and the intake and the outlet were the same.

Q. I show you a drawing and ask you if you know what that structure represents?

A. Yes, sir, that is the McIlvrid grout machine.

(Testimony of T. J. McCormick.)

Mr. TOWNSEND.—The witness refers to an enlargement of the McIlvrid patent, drawing, 958,421, application filed November 2, 1905.

Q. Now, did this McIlvrid machine have any other trade name? A. Not that I know of.

Q. Do you know the concern that manufactured it?

A. The Union Iron Works of Kansas City—of Hoboken.

Q. Are they manufacturing those to-day?

A. Yes, sir.

Q. Who handled them, do you remember, originally in 1905?

A. I am not positive whether it was the Ransome people or whether it was the Union Iron Works. I don't know which it was.

Mr. WILLIAMS.—Could you speak a little louder?

The WITNESS.—I am not positive whether it was the Ransome people or whether it was the Union Iron Works. I don't know which it was.

Q. Do you remember the Cockburn-Barrow machine? A. Yes, sir.

Q. Do you remember having a machine called the "Cockburn-Barrow machine"?

A. Yes, sir, we had a machine like that on the East Boston tunnel, very similar to this one, only a cast-iron [377] cylinder.

Q. How successfully were these machines shown in that drawing, 175, or the machines shown in the Canniff patents drawings or the machine shown in

(Testimony of T. J. McCormick.)

the McIlvrid patent drawings in the matter of operating? A. Very successfully.

Q. Have you ever seen a machine of a Canniff design employed for shooting grout? A. Yes, sir.

Q. What is that machine known as?

A. The Canniff-Ransome machine.

Q. What does the Ransome stand for?

A. I do not know what it stands for. They control it.

Q. Do you know the name of the company?

A. The Ransome Concrete Machinery Company.

Q. Is that the company with which the gentleman is identified who testified yesterday? A. Yes, sir.

Q. Now, how did that Ransome Canniff concrete gun compare with or differ from, if it did, the Canniff grout gun shown in the patent?

A. Practically the same, only on a larger scale. There was a larger discharge and a larger cylinder.

Q. In your opinion as an engineer, is there any difference in operation between the conveying of concrete and the conveying of grout by compressed air? A. Practically none.

Q. I show you a drawing or an enlargement of a drawing and ask if you recognize that apparatus? What is it supposed to represent? [378]

A. It is a multiple Canniff machine.

Q. A what?

A. A multiple Canniff machine. It goes through on one line.

Q. Does that represent a type of Canniff machine that you are familiar with? A. Yes, sir.

(Testimony of T. J. McCormick.)

Mr. TOWNSEND.—I ask that this be marked for identification Exhibit 176. Your Honor, do you care to have these other enlargements marked or just use them for illustrative purposes, since the patents themselves are in evidence. I will offer them if I may—I will have the Canniff exhibit marked 177, of the defendant, and the McIlvrid patent enlargement, 178.

(Whereupon drawings representing type of Canniff machine was marked Defendant's Exhibit 176 for Identification; another drawing of a type of Canniff machine was marked Defendant's Exhibit 177 for Identification, and McIlvrid patent enlargement was marked for Identification Defendant's Exhibit No. 178.)

Q. Do you know where there is a machine like the Canniff machine shown on Defendant's Exhibit 177? A. Yes, sir.

Q. Where is it?

A. Downstairs in this building.

Q. Where did that machine come from?

A. From New York.

Q. Did you have anything to do with getting that machine in New York? A. Yes, sir.

Q. Is that the machine that was introduced in evidence and [379] shipped to San Francisco in connection with the previous depositions we have referred to? A. Yes, sir.

Q. And where did you get that machine from?

A. From Patrick McGovern & Company.

Q. Where? A. Long Island City.

(Testimony of T. J. McCormick.)

Q. Had that machine been in use? A. Yes, sir.

Q. Did you use that particular machine?

A. Yes, sir.

Q. Does it show evidence of use now?

A. Yes, sir.

Mr. TOWNSEND.—Your Honor, that machine is in the basement and we will offer it in evidence as Defendant's Exhibit 179 and we ask—we invite the Court and counsel later to inspect it.

The COURT.—There is no objection to that.

(Whereupon Canniff machine was admitted in evidence and marked Defendant's Exhibit No. 179.)

The COURT.—What times does the Canniff machine date from—what is the name of it?

A. The Canniff machine—C-a-n-n-i-f-f.

Mr. TOWNSEND.—It goes back to—

The COURT.—(Interrupting.) It does not show on here where it dates from.

Mr. TOWNSEND.—That is a patent drawing, and a patent drawing—

The COURT.—(Interrupting.) I am not asking you what that is—I am asking you when that patent goes [380] back to?

Q. When was that particular machine made, do you know? A. First about 1908 or 1909.

Q. Were you able to find a Canniff machine in existence any earlier than that? A. No, sir.

Q. Did you make or did you not make diligent search? A. I did.

Q. And is there in existence to-day a Canniff machine earlier than this one?

(Testimony of T. J. McCormick.)

A. I presume there are a lot of them, but I could not find any.

The COURT.—Well, how far do they date back? That is the question.

A. My first association was in 1905.

The COURT.—Of this one, the same as this one?

A. Yes, sir.

The COURT.—Proceed. You may cross-examine.

Mr. WILLIAMS.—If the Court please, I should like to see this exhibit in the basement before cross-examining the witness on his testimony regarding it.

The COURT.—Cross-examine him now. If you want to call him again you may. They say the machine is the same as this drawing.

Mr. TOWNSEND.—I would state further, your Honor, that that machine was in evidence in New York and Mr. McCormick was there and he was rigidly cross-examined by Mr. Cox on behalf of the plaintiff. Of course, we have no objection. [381]

Cross-examination.

(By Mr. WILLIAMS.)

Q. You say that this grout about which you have been testifying in connection with these machines was used for grouting leaks in tunnels?

A. Yes, sir.

Q. Now, just what does that mean? What caused the leaks?

A. In the construction of the work, some of the steel rings were spread. Each plate has a grout

(Testimony of T. J. McCormick.)

ring through,—to surround the outside of that shell with a grout ring,—to stop leaks on the outside of the tunnel.

Q. How large is the space that is filled by this grout? Are they cracks or little openings?

A. Well, the only evidence of cracks is on the inside. Nobody can tell what is on the outside.

Q. Well, whatever cracks or little openings there may be are filled by this grout? A. Yes, sir.

Q. And that is what the thing was used for?

A. Yes, sir.

Q. Now, this grout that was used for that purpose, that was a mixture, was it, of water and sand and lime, or water and sand and Portland cement?

A. Well, it was all sorts of mixtures—cement and water, that is, neat cement and cement, sand and water.

Q. Well, those materials—for example, did you take neat cement, that is, cement and water only? That is plastic material, a little thicker than paint, isn't it? It flows—it will flow—

A. (Interrupting.) I do not know much about the consistency [382] of paint so that it will flow freely.

Q. About the consistency of paint?

A. Yes, sir.

Q. So that it will flow freely, you say?

A. Yes, sir.

Q. And the same applied to all these mixtures of grout, I take it? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. Now, when these grouting machines that you have described—in all these grouting machines that you have described there were valves such as are best illustrated perhaps in this McIlvrid patent or cocks, were there not? A. Yes, sir.

Q. Those are all ordinary water cocks, aren't they?

A. Those are the outlet cocks. That is, the outlet or discharge line.

Q. I am not talking about whether water or something else flowed through it, but I mean the construction in there. It was just a tapered flood cock as plumbers use in water pipes?

A. Not plumbers; steam fitters.

Q. Well, just like steam fitters would use.

A. Yes, sir.

Q. That had a tapered flood with a little rectangular opening through it, did it? A. Yes, sir.

Q. And this paint-like grout flowed through the rectangular hole in that plug valve, did it?

A. Yes, sir.

Q. Now, as I understand the operation of this McIlvrid [383] machine, for example, this grout of approximately the consistency of paint was stirred up by these paddles within this chamber?

A. Yes, sir.

Q. And mixed there? A. Yes, sir.

Q. Where was the cement or cement and sand put into this machine? A. At the top door.

Q. That was opened and those materials put in?

A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. And was water then put into this box also?

A. Yes, sir, right through the top.

Q. Right through the top? A. Yes, sir.

Q. And then the paddles churned up—churned it up into this paint-like material? A. Yes, sir.

Q. Then, as I understand you, this valve at 15 was opened so that compressed air got into the box on top of this paint-like material?

A. The door was shut first and then the air turned on.

Q. And when this air pressure was applied it forced this paint-like grout through the bottom of the box and out through this pipe and this tapered plug cock and through a hose, was it?

A. A hose or pipe.

Q. A rubber hose? A. A discharge line.

Q. Forming the discharge line? [384]

A. Yes, sir.

Q. And it was carried through that pipe or hose to these cracks or leaks in the concrete or steel or brick tunnel? A. Yes, sir.

Q. And applied to the cracks to seal them up?

A. Yes, sir.

Q. That was somewhat comparable to what a mason does in brickwork with his trowel when he plasters up or points up the spaces between bricks —that is fills cracks in that way?

A. Oh, no, it is forced right into the fissure with pressure and not plastered on the face.

Q. Forced into the fissure? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. By whatever pressure was available at the end of this hose? A. Yes, sir.

Q. Now, that, in a general way, describes also the operations of these other grouting machines and the material used in them, does it?

A. Absolutely the same.

Q. Now, this double-barrelled Canniff drawing that was—that is marked here Defendant's Exhibit 176, is that a drawing which you made yourself?

A. No, sir.

Q. Or had made? A. No, sir.

Mr. TOWNSEND.—That is for identification, your Honor. It has not been proven yet. [385]

Mr. WILLIAMS.—Well, I am examining the witness about it.

Q. Do you know where it came from?

A. No, sir.

Q. You say you saw apparatus such as is shown in this drawing, defendant's exhibit No. 177 for identification? A. Yes, sir.

Q. And that drawing shows the sizes of these pipes, does it—two-inch pipe? A. Yes, sir.

Q. Two-inch pipe there? A. Yes, sir.

Q. Half-inch bleeder here?

A. Yes, sir. The difference between that machine and the other one is that this is a high pressure machine used by the board of water supply on the waterworks in New York.

Q. These valves are shown on this drawing are ordinary gate valves such as are used by plumbers or steam-fitters?

(Testimony of T. J. McCormick.)

A. They are very high pressure valves.

Q. Well, they are gate valves?

A. Yes, sir, to keep open the gates.

Q. And this drawing, I presume, is intended to indicate here—

A. (Interrupting.) Is the outside.

Q. I mean at this place marked "One" in the air inlet, that is where the compressed air came in on top of the grout within the box here, is that right?

A. Yes, sir. [386]

Q. Now, the operation of this double-barrel dual Canniff device, that was just like the single one, except there were two, isn't that right?

A. Well, you will notice the difference in the thickness of that shell. This shell is ¾ of an inch thick and will stand three or four or five hundred pounds pressure and this one is good for fifty or sixty. At any rate, except for the fact that higher air pressure was used, and the machine was made stronger in order to accommodate that higher air pressure, and except for the fact that there were two barrels for the releasing, instead of one, the operation was the same as you have described for the McIlvrid machine?

A. The Canniff machine. They are just the same.

Q. Well, they are just the same, are they?

A. Yes, sir.

Q. And the material used for this Canniff arrangement was such grout as you have described?

A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. Now, you said that some of these grouting machines—I think you named the McIlvrid, that is still in use to-day, didn't you say? A. Yes, sir.

Q. And the Canniff? A. Yes, sir.

Q. They are used for grouting work such as you have described? A. Yes, sir.

Q. To-day? A. Yes, sir. [387]

Q. Just as they were when you first knew them?

A. Yes, sir.

Q. 1902 or 1905? A. Yes, sir.

Q. I guess 1898 you spoke of it, didn't you?

A. Well, in 1905, the Canniff.

Q. Well, at any rate, from the time you first learned of them down to the present date?

A. Yes, sir.

Q. They have always been used for this grouting in the manner that you have described?

A. Yes, sir.

Q. You handled substantially that same grout material? A. Yes, sir.

Mr. WILLIAMS.—That is all.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. Mr. McCormick, from your experience in handling the work of concrete, and so forth, is this machine, illustrated in Defendant's Exhibit 176 for Identification, applicable to the transportation of concrete? A. Yes, sir.

Q. By means of compressed air? A. Yes, sir.

(Testimony of T. J. McCormick.)

Q. In the manner that you have already described? A. Yes, sir. [388]

Mr. WILLIAMS.—If the Court please, my associate has determined the exhibit numbers of these two patents to which I made objection. No. 140 is the Smith patent, 122,497; and No. 142 is the Goodrich patent, No. 333,887, if I have the date and the number and the name right. To both of these I object upon the ground that they are not set up in the bill of particulars.

Mr. TOWNSEND.—Your Honor, they are not properly in the bill of particulars, because they are there to show the state of the art. The Smith patent is a companion patent to the Smith 1872 concrete patent, and it has a cross-reference to the patent set up. So it is a part and parcel of the Smith patent.

Mr. WILLIAMS.—If the Court please, I think it was clearly—

The COURT.—(Interrupting.) The bill of particulars was intended to show what patents were intended to be introduced here. Objection sustained for any purpose.

Mr. TOWNSEND.—Exception. [389]

TESTIMONY OF ROY C. HACKLEY, FOR DEFENDANT.

ROY C. HACKLEY, defendant's witness.

I am the Roy C. Hackley who has already been called and sworn in this case. I have trained as an

(Testimony of Roy C. Hackley.)

engineer and have followed the construction business for about 18 or 19 years as superintendent, engineer and contractor. I studied engineering for four years at California and one year at Harvard University. [390]

Q. Reference has been made to defendant's apparatus here and identified in connection with R. C. Hackley patent, March 1, 1927, No. 1,619,297. I show you the enlargement of the same and ask you if you are the same R. C. Hackley? A. I am.

Mr. TOWNSEND.—At this time I will offer this drawing as Defendant's Exhibit No. 180.

(Whereupon drawing of Hackley patent No. 1,619,297 was admitted in evidence as Defendant's Exhibit No. 180.)

Q. Now, what were the circumstances, Mr. Hackley, in connection with getting up that gun?

A. That was gotten up at the time that the Skagit work was being prosecuted. It was put in when the gun we started to use was condemned by the city engineers—that is, the work being done with it was condemned.

Q. That gun which was condemned, I believe, has already been described and identified as a so-called McMichael gun? A. Yes, sir.

Q. Did that so-called McMichael gun—

Mr. WILLIAMS.—I object to that last question as leading.

Mr. TOWNSEND.—I am just summarizing the testimony.

The COURT.—Oh, yes, overruled. Proceed.

(Testimony of Roy C. Hackley.)

Q. Now, that McMichael gun used a U-bend corresponding to or similar to or like the bend No. 24 in the enlargement of the McMichael patent drawing in suit?

Mr. WILLIAMS.—If the Court please, I object to that statement as assuming a statement not in conformity with the evidence. The evidence was that that machine first [391] used at the Skagit river project was a machine made by R. C. Storrie and Company, or for them, and not by the plaintiff.

Mr. TOWNSEND.—This is preliminary.

Mr. WILLIAMS.—Counsel says, "In the McMichael machine they are used." It never was "McMichael" with the sanction or authority—

The COURT.—(Interrupting.) The Court so understands. It is merely a name that is given to it. Proceed. Let him answer the question. Overruled.

A. That gun had no bend or trap.

Q. Have you ever seen a gun of the type or character or design of this McMichael drawing that had a U-bend? A. No, I have not.

Q. What, from your knowledge as an engineer and your experience in handling concrete materials would be the effect of the interposition of the U-bend in the outlet of a concrete gun?

A. It would form a trap and would prevent the concrete from leaving the gun.

Q. And the result would be what? A. A plug.

Q. And when you get a plug, what happens?

(Testimony of Roy C. Hackley.)

A. There is no movement of the concrete or discharge.

Q. What do you do then?

A. If it is a serious plug you have either to disconnect the pipe or take the concrete out of the pipe. You cannot do it by hammering on the pipe.

Q. How did the concrete come out of that gun that was condemned—that so-called McMichael gun? Did it come out in a continuous flow or by a so-called flood action, such as this expert, plaintiff's expert Mr. Ray has [392] described as in his opinion exists.

A. Came out in a continuous stream.

Q. What would be the effect in your experience of a so-called plug action or the cause of a so-called plug action?

A. If a slug does form in the pipe it will form a plug and stop the action entirely. In order to have the concrete continue to go through in the pipe, the air has got to go through with it. As soon as the air is stopped the flow stops entirely.

Q. Now, in a machine according to your patent shown on Exhibit 180 before you, or the drawings of your patent exhibit 180, and the machine used on the Skagit job, claimed here to infringe, how did the material issue from the discharge pipe?

A. In a continuous stream, mixed with the air.

Q. Was that projected impulsively and violently, or slowly?

(Testimony of Roy C. Hackley.)

A. It could be controlled by the operation of the valves. The speed of the discharge could be controlled by the operation of the valves directly.

Q. What is the practice?

A. That is the practice.

Q. To do what?

A. To control the discharge and make the discharge as slow as possible.

Q. To control the discharge and make the discharge as slow as possible? A. Yes, sir.

Q. What is the purpose of that?

A. To prevent separation of the concrete and to prevent also—make the wear on the pipe less.

Q. When the concrete leaves the gun and blows out of it in [393] your machine, what happens to the concrete itself, does it stick in a mass or does it flow by gravity down the side?

A. It flows by gravity.

Q. That is wet concrete or dry concrete?

A. Wet concrete.

Q. Do you know what dry concrete is?

A. Dry concrete is concrete that requires tapping —tamping or ramming to get it into place.

Q. Can dry concrete, as known to engineers, be used in a gun of this sort?

A. No, it cannot.

Q. Can it be used in a gun of McMichael character? A. No, it cannot.

Q. Do you know when wet concrete came into effect?

(Testimony of Roy C. Hackley.)

A. There was a transition from dry to wet concrete around 1907 or 1906—1906 or 1907. They were still using some dry concrete at that time.

Q. Were there advocates for one school or class?

A. Yes. There was a difference of opinion whether the concrete should be dry and require ramming in order to bring water to the surface, or whether wet concrete would be better.

Q. Have you ever used your gun for shooting anything besides concrete?

A. I have. I have used it for shooting grout.

Q. And when you used it for shooting grout, what did you do with your gun?

A. Simply reduced the size of the discharge to satisfy the size of the grout,—to suit the size of the grout pipe that we were using. [394]

Q. How was the air let into your gun when you were using grout?

A. In the same manner as when we were using concrete.

Q. When you were shooting grout through this reducer, how did the grout issue from the end of the gun? A. In a steady stream.

Q. Could you identify any photographs that I show you illustrative of any part of your testimony?

A. Yes. That is one of my concrete guns. (Indicating.)

Q. Anything else in connection with it appearing there?

(Testimony of Roy C. Hackley.)

A. This one has a reducing flange on it, using it for the purpose of shooting grout.

Mr. TOWNSEND.—I will ask that this one that has been last referred to be marked for identification Defendant's Exhibit 181 and the other one be marked for identification Defendant's Exhibit 182.

Q. Are you familiar with the Canniff gun that we have been talking about here in evidence?

A. I am.

Q. Have you ever used one?

A. I have used the same type—the exact copy of it.

Q. Have you ever used a machine such as is illustrated here, Defendant's Exhibit 176?

A. I have—a single machine.

Q. In a single machine was the type as far as the one machine, at the left we will say, is concerned, alike or unlike drawing 176 for identification?

A. It is practically the same as that.

Q. And that—did that successfully blow the material from the gun by means of compressed air?

A. It did. [395]

Q. In your opinion is the machine shown here on Defendant's Exhibit 176 adapted to blowing concrete? A. Yes, that will blow concrete.

Q. Have you ever blown concrete with a gun similar to this? A. I have.

Q. Have you one of your guns in operation anywhere, or had one anywhere recently in operation—

(Testimony of Roy C. Hackley.)

strike that out, please. Have you had one of your guns in operation at the so-called Maloneys' project in California? A. Yes, sir, I have.

Q. Where is Maloneys' located?

A. It is on the Stanislaus River.

Q. How did that gun compare with the Skagit gun?

A. It is the same as the Skagit gun.

Q. And how did the material that you shot through it compare with the material used on the Skagit project?

A. The concrete was practically the same. Same consistency.

Q. Do I understand it was the same formula—do I understand it was the same or a different formula of consistency?

A. The consistency was the same. The mix was a trifle different.

Q. How did the concrete come out of that gun?

A. It comes out in a continuous stream.

Q. You said that you had shot concrete through a machine similar to the Canniff machine?

A. Yes, sir.

Q. I show you a photograph and ask you if you know what that is?

A. That is the grout machine built by myself—twelve [396] cubic feet machine.

Q. And where is that machine located? [397]

A. In San Francisco.

Q. And what materials have you shot through that? A. Shot grout or concrete.

(Testimony of Roy C. Hackley.)

Q. And was a demonstration made of the use of that in shooting concrete recently?

A. There was, about a week ago.

Q. And is that the time that we held a demonstration to which we had invited the plaintiff and its attorneys to attend?

A. Yes. I understood that you invited the plaintiff.

Q. Now, at the same time did you demonstrate the shooting of any other material through another type of gun? A. I did.

Q. I will show you some photographs and ask if you recognize those. First, I will offer this photograph, I will just offer all those photographs in just a minute.

A. Yes, I recognize these photographs. I had them taken.

Q. Under whose direction were these photographs taken?

A. They were taken under my direction.

Q. Do they truly and correctly represent what they purport to show? A. Yes, they do.

Mr. TOWNSEND.—I offer this first Canniff type gun as Defendant's Exhibit 183 and I offer the other photographs identified by the witness, respectively as Exhibits 184 and 185.

(Whereupon photographs of Canniff machine was admitted in evidence as Defendant's Exhibit No. 183 and two other photographs were admitted in evidence as Defendant's Exhibits 184 and 185 respectively.)

(Testimony of Roy C. Hackley.)

Q. Now, take photograph exhibits 184 and 185 and tell us what they represent, and tell us what was done at the time that those tests were performed publicly? [398]

A. They represent a machine built for the purpose of shooting concrete through a pipe. The discharge pipe is a four-inch pipe with a four-inch valve on it directly under this container. On top there is a two-inch and a quarter air connection. The air was let into the chamber under a 100-pound pressure. On the side was an opening for filling concrete or materials to be discharged from the pipe. We first filled that container with water and turned on the air and opened the valve at the bottom after plugging the inlets—the charging opened the valve at the bottom and the water was discharged through the pipe.

The COURT.—What is the object of this?

Mr. TOWNSEND.—This is a demonstration of the Smith patent of 1872 showing it to be a practical machine. Very similar to the Siemens' situation in the Anaconda case.

The COURT.—Proceed.

A. I might say that the end of that discharge pipe was about thirty feet from the machine and at an elevation of about twenty feet above it. After shooting the water out, we filled the container with concrete and shot that out in the same manner. We then used concrete—mixed concrete with rock up to an inch and a half in size of two different consistencies or two different mixtures and

(Testimony of Roy C. Hackley.)

that was discharged in a continuous stream in the same way.

Q. You say that the concrete was in two different mixtures. Will you please tell us what those mixtures were?

A. The first mixture by weight—one of cement and one of sand and three of rock. The second mixture, one of cement, two and a quarter of sand and about four and three-quarters of rock. [399]

Q. By volume of weight?

A. By volume,the second one.

Q. Now, will you just mark, please the receptacle with the letter "A" and the discharge pipe with the letter "B" on both of those?

(Witness marks same.)

Q. Who in the courtroom was present at the time that that demonstration was made?

A. Mr. Loftus, Mr. Peterson, Mr. Wilkins, yourself and myself.

Q. Is that machine here in town?

A. It is. It is in the basement of this building.

Q. What does that machine weigh?

A. About 500 pounds.

Mr. TOWNSEND.—We will offer that machine in evidence, your Honor, as Defendant's Exhibit 186.

(Whereupon Smith's machine was admitted in evidence as Defendant's Exhibit No. 186.)

Mr. TOWNSEND.—We will offer further proof on its manufacture, design, etc.

(Testimony of Roy C. Hackley.)

Q. You said that the pipe of that demonstration machine represented in the photographs 184 and 185, extended up about twenty feet in the air?

A. Yes, sir.

Q. Why was that?

A. Because that is the usual working condition that any concrete gun works in.

Q. How near do the working conditions in other respects correspond for the demonstration to present every-day working conditions? [400]

A. Just practically the same as everyday working conditions as near as we could get them.

Q. In your opinion as an engineer, did they shoot the concrete successfully?

A. Yes, they shot the concrete successfully.

The COURT.—Do not let the examination drag.

Mr. TOWNSEND.—No, your Honor.

Q. You heard the plaintiff's expert, Mr. Ray, speak about listening to material going through the pipe and giving it as his opinion that there were slugs passing and that he also put gauges upon the pipe. State what you know about the use of gauges upon a discharge pipe for measuring the flow or the consistency, etc., of material like concrete?

A. If the statement was made that the gauges were put on the discharge pipe, they would not act. They would fill with concrete right away.

Mr. TOWNSEND.—Q. We offer that Hackley certificate—the certificate of the original Hackley patent, referred to as Exhibit 187.

(Testimony of Roy C. Hackley.)

(Whereupon original Hackley patent was exhibited in evidence as Defendant's Exhibit No. 187.)

Mr. TOWNSEND.—That is all.

Cross-examination.

(By Mr. WILLIAMS.)

Q. Now, these gentlemen that you named have witnessed this so-called public demonstration a week ago, none of those gentlemen were connected with the plaintiff's side of this case, were they? [401]

A. No.

Q. You know them all and you know what their interests are? A. Yes, sir.

A. They are all interested with you on the defendant's side?

A. They are not interested with me except as witnesses.

Q. Now, in this demonstration of the Smith's apparatus, as illustrated in these photographs, defendants exhibits 184 and 185, you say that that apparatus worked satisfactorily in shooting or discharging concrete. Was all of the concrete discharged from the chamber of that apparatus with each mix and blow?

A. Not all of it, no. Very seldom is.

Q. Some are left? A. Yes.

Q. How much was left?

A. Oh, possibly ten per cent of it or possibly fifteen per cent.

Q. Why was that ten or fifteen per cent left?

(Testimony of Roy C. Hackley.)

A. Because it was flat bottom.

Q. On account of the flat bottom of the chamber?

A. Yes, sir.

Q. Where does the discharge pipe leave, at the center of the bottom or near one side of the bottom?

A. Center of the bottom.

Q. So that there was a square bottom chamber, was there, such as is shown in this Smith patent, 122,498, and a discharge pipe leaving the center about as there illustrated? [402]

A. Yes, that is correct.

Q. Now, was the concrete which you say you discharged from that tank a week ago, was that such material as is described in this Smith patent where it says here, "The composition is sufficiently liquid to settle to a perfectly level surface." Was it of that character?

A. Yes, it had settled pretty close to a level surface. Some of it would.

Q. Well, this says "To a perfectly level surface."

A. Well, I don't know whether you would call it perfectly level or not.

Q. Well, I am asking you, of course, about the material that you used in this machine. Was that of this character which would settle to a perfectly level surface?

A. No, that would not settle to a perfectly level surface without agitation.

Q. It would not? A. No.

(Testimony of Roy C. Hackley.)

Q. And it was for that reason that some of this material was left on the flat floor of this tank?

A. Yes.

Q. And was not discharged, was it?

A. Yes, sir.

Q. Now, if you had used enough water in that composition so that it would have the characteristics described by Smith here—that is, being a composition sufficiently liquid to settle to a perfectly level surface, then none of that material would have been left in the bottom of that chamber?

A. Yes, sir, some of it would have been left. [403]

Q. It would have? A. Yes.

Q. Why would it have been left?

A. Because the liquid part would be blown off and leave some of the dry portions in the corners.

Q. That is, a little sediment would settle?

A. If there was rock there some of the rock would stay in the corners.

Q. But in the main, if the material was of a liquid consistency described in this Smith patent, then the bulk of it would go out except for some little settling?

A. It would gradually collect in there.

Q. Collect where?

A. Collect in the corners.

Q. Then do you claim the material which you did discharge from this flat bottom Smith tank—I suppose that had merely air pressure on top of it?

(Testimony of Roy C. Hackley.)

A. Yes, sir.

Q. There was no second jet which by its velocity broke up or compacted the concrete material and carried it along through the duct either in slugs or otherwise, was there, in your demonstration of this Smith apparatus? A. No, there was not.

Q. You relied merely on the air pressure supplied to the top of that tank to force the paint-like concrete out of the bottom, did you?

A. To force the concrete out of the bottom, yes.

Q. Now, of course, in the Hackley machines which you designed and which you put in use on this Skagit work and at Maloneys, did you say— [404]

A. (Interrupting.) Yes, sir.

Q. (Continuing.) —I suppose you have done that elsewhere, also? A. Yes, sir.

Q. You, of course, are not satisfied with and you do not rely upon air pressure on the top of the concrete only as in this Smith box or tank, do you?

A. No, sir.

Q. You have second jets which blows a stream of air into the chamber just in advance of the exhaust duct and directed toward that duct, do you not? A. Yes, sir.

Q. Now, of course, there is a reason why you do that, isn't there? A. Yes, sir.

Q. One of the reasons is that you get a different and a better action, don't you?

A. You start the—

Q. (Interrupting.) Well, I am asking you.

(Testimony of Roy C. Hackley.)

This is cross-examination. Answer either yes or no. A. Yes.

Q. Now, by this demonstration—I suppose this was intended to be a demonstration, was it, of the Smith patent. Did you get up this apparatus?

A. I don't know whether this was the Smith patent or not.

Q. Did you make up this apparatus?

A. I did not make it up. It was delivered to me and I set it up.

Q. Who delivered it to you?

A. Mr. Muir. [405]

Q. Who? A. The R. C. Storrie man.

Q. Now, let me see. Now, in this Smith patent there is shown, is there not, a valve in the discharge pipe? A. Yes, sir.

Q. Was there such a valve or any valve in the discharge pipe of this apparatus shown in your exhibit or in exhibits 184 and 185? A. There is.

Q. Can you point to them?

A. This valve right there (indicating). A big operating gauge valve—a slide valve. It is right in the discharge pipe there. (Indicating.)

Q. What shows here is merely the handle?

A. It shows the handle. I don't know whether it shows any better than that in that one or not.

Q. Now, you have testified that in a machine such as that illustrated in the McMichael patent, that if there was a U-bend in the discharge pipe or at the bottom of the chamber, that in your opinion the

(Testimony of Roy C. Hackley.)

concrete would pack in that bend and choke up the discharge pipe. That was your opinion, was it, if I rightly understood you?

A. That is my opinion.

Q. Now, supposing material, so-called concrete which was so thin a fluid, as to have the characteristics of settling to a perfectly level surface, as described in this Smith patent were to go into the chamber of the McMichael patent and the air pressure were turned on to the top of that chamber and on to the top only, would that material choke in that U-bend or would that flow through [406] like water? A. The water would blow out first.

Q. Would that material go through?

A. Some of the gravel might go through and it might stay in.

Q. If it would go out of this tank, shown in the photographs Defendant's Exhibits 184 and 185,—if it were sufficiently liquid and fluid to flow out of that tank, why wouldn't it flow through that U-bend of the McMichael apparatus?

A. I do not say that it would flow out of that tank —the concrete that was put in there.

Q. Didn't it flow out?

A. No, it didn't. It dropped out when we opened the valve. Yes, that started up the discharge.

Q. What do you mean by "dropped"; didn't it flow?

A. When the trap was opened it started the discharge.

(Testimony of Roy C. Hackley.)

Q. Didn't it flow?

A. It acted the same as a jet of air.

Q. What did? A. The opening of the valve.

Q. Do you mean to say that the opening of the valve acted the same as a jet of air?

A. Yes, underneath it. It started through the discharge pipe.

Q. That is, the gravity that caused that to drop down out of that tank, that was comparable to the action of an air jet?

A. It broke the bond right at the opening.

Q. What do you mean by "bond"?

A. It broke the surfacing of the concrete right at the discharge [407] opening.

Q. It broke some of the air and it dropped some through there?

A. It started to drop through.

Q. Didn't it flow through?

A. You can call it dropping or flowing through there.

Q. Which was it? A. Both.

Q. You said that that concrete came out like a stream of water—in a solid stream?

A. I said it came out in a solid stream mixed with air.

Q. Isn't it a fact that you testified that you put the water in the tank and put the air pressure on that that the water flowed out in a solid stream?

A. Mixed with air.

Q. How did the air get in?

(Testimony of Roy C. Hackley.)

A. It mixed right through with it.

Q. Where did it get in?

A. In the passage through the pipe.

Q. Now, let me see if we understand what we are talking about?

The COURT.—Do not spend so much time wrangling with the witness.

Q. If I understand you, you had a tank here and how much water did you put in there?

A. About ⅔ full.

Q. You filled that two-thirds full of water?

A. Yes, sir.

The COURT.—Do not repeat so much. He said so and let it go at that. [408]

Q. Then there was a discharge pipe which led from the bottom of that tank horizontally some distance, I presume, and then up about twenty feet?

A. Yes, that is correct.

Q. Then you applied air under pressure to the top of that tank there by an inch and a quarter pipe? A. That is correct.

Q. Didn't that air pressure acting on the top of that water in that tank press the water downwardly and into the discharge pipe?

A. No, not with the valve closed.

Q. Not with the valve closed? A. No, sir.

Q. Did you open the valve after the air pressure was turned on?

A. At approximately the same time.

Q. At approximately the same time?

(Testimony of Roy C. Hackley.)

A. Yes, sir.

Q. Now, did the pressure acting on the surface of that water force that water down through that pipe in a solid stream, filling the discharge pipe?

A. It mixed with the water as it went out.

Q. What made it mix?

A. The pressure of the air. The air travelled faster than the water.

Q. And that water coming out in the way it did, in the way you now describe, is what you mean when you say that the water came out in a solid stream, is it?

A. In a solid stream mixed with the air.

Q. And that is the way that the grout came out, is it? [409]

A. The grout comes out that way unless some of the valves are opened on the top of the grout and forces it out in a solid stream.

Q. You operate in the same way with the water and the grout as you did with what you called the concrete, didn't you? A. Yes, sir.

Q. And the water came out in a way—

The COURT.—(Interrupting.) Do not repeat. He has gone over that.

Q. The concrete came out in the same way as the water did? A. Yes, sir.

Q. And in the same way as the grout?

A. Yes, sir.

Q. And you heard Mr. McCormick's testimony here, did you? A. Yes, sir.

(Testimony of Roy C. Hackley.)

Q. And the grout that you used in that apparatus of exhibits 184 and 185 is the grout as he described it, is it? A. Yes, approximately the same.

The COURT.—Anything further? If not, redirect.

Mr. WILLIAMS.—I have not finished my cross-examination.

The COURT.—Conclude it. If you must look at the paper and you do not have it in your head, I am sure it is not very important.

Q. You said in connection with some demonstration of the Hackley grouter in California a week ago that plaintiff or plaintiff's counsel were invited to go, did you?

A. Yes, I do not know whether they were invited or not. I was told that they were invited.

Q. And you assented to the fact here in your testimony that [410] they were so invited, didn't you?

A. I understood from my attorneys that they were invited.

Q. Who told you? A. Mr. Townsend.

Q. Were any such attorneys there whom you recognized or were told were the attorneys for the plaintiff? A. None that I know of.

Q. And you don't know except as you were told that any such representative was—

A. (Interrupting.) There was no one there that I did not recognize.

Q. I am asking you another question now.

(Testimony of Roy C. Hackley.)

The COURT.—Well, he has told you that he only knows that by hearsay. That is sufficient. If you want to move to strike, move to strike without wrangling too much.

Mr. WILLIAMS.—I do move to strike.

The COURT.—It is stricken. Proceed now. Redirect if you have any.

Mr. TOWNSEND.—Just one question.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. When was that demonstration held? The hour at which it was held?

A. At four o'clock on the afternoon of September 7th, I believe. [411]

TESTIMONY OF ROY WILKINS, FOR DEFENDANT.

The next witness for the defendant was ROY WILKINS, age 39, who is an electrical engineer specializing in research and test work and who has been engaged in engineering research work since 1910. He was familiar with the apparatus in controversy and knew the Hackley gun, with the operation of which he had made tests.

The COURT.—Interrupting, asked, "Is the Hackley gun the gun that the defendant claims to be using?" to which Mr. Townsend stated, "Yes, sir."

The witness stated that being asked to make tests to find out what the nature of the flow of concrete was from a Hackley gun, followed the procedure

(Testimony of Roy Wilkins.)

used in testing the speed of projectiles from large caliber guns, that is, two contacts are made which the projectile will short as it passes them. The current is applied through the circuit which passes through this with an element of an oscillograph, which is a sensitive ammeter leaving a record on a moving film. For the concrete he used a rubber hose six inches in diameter, the same size as the concrete ejection pipe and put in the rubber hose iron electrodes which came flush with the inside of the hose. These were connected with a battery and the oscillograph element in series and a record was taken of the current as the concrete was shot through. Mr. Wilkins stated that if the pipe is full, the concrete as it goes out will give a record on the film. If the pipe is empty it gives no record at all. If the concrete went out in plugs or slugs, it would give a hump and then drop back to zero and then drop back and give another hump as each went by. As concrete is mixed with air it gives a deflection that is not as great part way up. If it is perfectly uniform it gives a perfectly uniform straight line. If it is [412] broken up or the concrete changes —the mixture of the concrete and the air changes— it gives a wavy line. From these tests you can determine the exact nature of the flow and about its speed.

He had a drawing of the apparatus used in making these tests which shows the electrode arrangement and the rubber pipe to which he had referred. There were two sets of electrodes marked the first

(Testimony of Roy Wilkins.)

and the second. They were put in the pipe in a position close to the gun and the first straight stretch of it is shown on the drawing at the positions designated by letters A, B, C, and D. The electrodes B and C are the lower ones and the front and back electrodes are designated on the drawing as 1 and 2. He had a record of the test to which he had referred. It is a record across the two bottom electrodes of the second section B and C and the two top electrodes of the second section together with a sixty cycle timing wave which is taken off the regular battery circuit and traced on the film so that sixty of the cycles will represent one second and he had counted them off and so marked them on the drawing in red pencil. This blue-print represents the time that the concrete flowed under the action of compressed air from the Hackley gun during the tests which he personally made and recorded, and he said the blue-print correctly represents what took place for about twenty and a half seconds.

Whereupon the drawing illustrating the apparatus of the test was offered in evidence as Defendant's Exhibit 188 and the oscillograph record as Defendant's Exhibit 189.

Explaining the exhibit 189 further. Mr. Wilkins said "When the pipe is completely full the deflection from the zero [413] which is indicated at the start would extend nearly across the film. It was a solid concrete, as concrete flows out without any admixture of air. In this, it indicates that "the concrete is mixed on the bottom with air to a great

(Testimony of Roy Wilkins.)

enough extent to drop down that deflection about halfway. On the top there is much more air that gives it more of a wavy motion and very much less deflection. Such little jumps as are shown in these places indicate that more current would pass through it and there is more evidence at the back end of the film where the pressure drops somewhat. Such an indication as this indicates that there was more concrete went through between those electrodes at that time."

"The whole film indicates that the flow is practically uniform with a mixture of air which remains the same."

Q. Do I understand from your testimony, then, that this oscillograph record, exhibit 189, represents in the solid line the solid concrete or more solid portion of the concrete?

A. More solid than at the top.

Q. And that the wavy and broken line represents the upper surface of the flow?

A. Not the upper surface. It still had concrete in it to carry the current. It had more air and less concrete.

Q. Now, why did you try gauges along the pipe to determine what was taking place?

A. For two reasons. First, the gauges are unsatisfactory and not fast enough to detect the changes that we desired measured and, second, because any pressure readings taken by a gauge only indicate the pressure at that point and not the nature of the flow.

(Testimony of Roy Wilkins.)

Q. What was the result of your findings by these tests? [414]

A. The general conclusions were that the concrete flowed through the pipe with a proper supply of air, practically a uniform mixture of air and concrete, somewhat denser at the bottom. That if the air pressure dropped, you could make it vary somewhat. However, it was still a mixture of air and concrete.

Q. Did you ever encounter any slugs or plugs such as Mr. Ray, plaintiff's expert has referred to?

A. There were not.

The COURT.—Do you mean that this was a continuous flow of the mixture. I want to know if this was a continuous flow of this mixture.

Mr. TOWNSEND.—The Court desires to know if this was a continuous flow of the concrete material through the pipe, or was it separated?

A. This particular record so indicates.

Q. Indicates what?

A. That it was a continuous flow of the mixture of air and concrete.

Q. And did you observe the concrete flowing or issuing from the discharge pipe? A. I did.

Q. And how did that correspond in appearance with your scientific record here?

A. It corresponds to my mind exactly in that it flows out of the end of the pipe much the same as the discharge from a deep well turbine pump. I would say.

The COURT.—Well, how is that.

(Testimony of Roy Wilkins.)

The WITNESS.—It has a uniform flow without any spurts or dumps and not necessarily solid. [415]

Q. What is the relative conductivity of concrete and air?

A. Air has a very low conductivity. Usually it is not measurable on the ordinary instrument. This particular concrete had a conductivity of about—in other words, its resistance was about 1200 ohms per foot cube.

Q. Then I understand that the conductivity of concrete is very much greater?

A. Very much greater.

Q. Were you present at the tests conducted last Wednesday at the east portal of the Sunset tunnel?

A. I was.

Q. In San Francisco? A. I was.

Q. Did you observe those tests? A. Yes.

Q. Did you take any photographs at the time of those tests? A. I did—movie pictures.

Q. And have you the record here of those tests, of what is called the Smith gun? A. I have.

Q. Will you produce them and explain to the Court what they show and mean?

A. We have a print from a movie film taken by a small Sept hand camera—that is a hand motor camera. And I have marked them "September 7, 1927, Smith Gun Concrete," because that is the time they were taken.

The COURT.—Well, have him tell us what was done.

(Testimony of Roy Wilkins.)

Q. Tell us what took place, Mr. Wilkins, will you please, and what you have recorded there.

A. We have one film of water on it. [416]

Q. Will you show that to the Court, and I will offer that in evidence as Defendant's Exhibit No. 190.

(Whereupon movie film was admitted in evidence as Defendant's Exhibit 190.)

The WITNESS.—The second shows a mixture of cement and water designated as grout.

Mr. TOWNSEND.—I offer the second film as Exhibit No. 191.

(Whereupon movie film print was admitted in evidence and marked Defendant's Exhibit 191.)

The WITNESS.—And the third film of concrete of a mixture approximately of one, one and a half and three.

Q. Do these photographs correctly show what took place when the different materials you mentioned were driven through that machine?

A. To my mind they do, yes, sir.

Mr. TOWNSEND.—I will offer that photograph as Defendant's Exhibit 192.

(Whereupon movie film print was admitted in evidence as Defendant's Exhibit No. 192.)

Q. Did you see the operation of the machine?

A. I did.

Q. Do you know what you might use to drive the concrete out of it? A. Compressed air.

Q. I might ask you one more question, Mr. Wil-

(Testimony of Roy Wilkins.)

kins, in regard to the rate of travel at the time that you made your oscillograph record?

A. At the point that the tests were taken it was between fifteen and twenty feet a second.

Q. Assuming twenty feet a second and you have shown—have you twenty seconds of record on that tape? [417] A. Yes, sir.

Q. That would represent 400 feet of lineal travel of the concrete passing over those electrodes at that time? A. Yes, sir.

The COURT.—Cross-examine.

Cross-examination.

(By Mr. WILLIAMS.)

Q. Now, you were asked whether some of these things or this material—this concrete material passed through the discharge duct as a continuous flow. Do you mean by that a flow of solid mass of concrete, or do you mean a concrete mixture intermingled with air?

A. It is a concrete mixture intermingled, aerating, I believe is the correct word.

Q. Now, that aeration, if you want to call it that, was not entirely regular when you had somewhat less air, pressure, is that right?

A. If you dropped the air pressure low enough the pipe would plug.

Q. If you did not drop it low enough the plug but made it somewhat lower than under the conditions that you normally or generally employed there, then there would become an irregularity, would there? A. There would.

(Testimony of Roy Wilkins.)

Q. And your oscillograph demonstrates that, doesn't it? A. It shows it, yes.

Q. And the air pressure which you employed and the quantity of air which was passed through there could be varied then in such a way as to make the concrete pass in irregular masses or in such a way as to make it pass in [418] what you would call a continuous stream, could it?

A. Not in that practical operation.

Q. But in accordance with your idea, that is the case, isn't it? A. Yes, sir.

Q. Now, you have produced here one oscillograph record showing twenty seconds, was it, of operation?

A. Twenty and a half seconds, yes, sir.

Q. Is that the only oscillograph record that you made? A. That is the only one that long.

Q. Well, did you make others shorter?

A. I made it shorter and watched it visually. You can watch it visually.

Q. I am not asking you about that. You made other oscillograph records did you? Did you make several?

A. There were at least three or four, yes, sir.

Q. Were there more than three or four?

A. About four, I should say.

Q. Well, were there more than four?

A. Yes, sir.

Q. Now, isn't it a fact that you made several until you secured the result that you have produced here? A. No, sir.

Q. Is this the first that you secured?

(Testimony of Roy Wilkins.)

A. This is in the middle of it.

Q. What is that?

A. This was in about the middle of it.

Q. About the middle? A. Yes, sir.

Q. That is, you made some runs of which you haven't produced the record and then you made the one of which you have produced the record, and then you made some more afterwards [419] and those are not here, is that right?

A. Those were not presented, no, sir.

Q. Did you vary the conditions, for example, the quality or pressure of air, as between those successive tests? A. Not to a great extent.

Q. Well, to any extent? A. Yes, sir.

Q. Now, will you look at one of the pictures of this strip—do you call this film, or print, or what?

A. This is print from a movie film.

Q. Now, do I understand correctly that this little picture here, about 5/8 inch by one—do you hear me? A. Yes, sir.

Q. That this picture here about 5/8 inch by approximately an inch in size is a picture of a retaining wall of some structure?

A. It is the end of the Sunset—one of the ends of the retaining walls in the ends of the Sunset tunnel in San Francisco.

Q. And the discharge pipe that you refer to is the little pipe that runs somewhat angularly across this picture when held right side up, is it?

A. It runs practically horizontal with the top.

(Testimony of Roy Wilkins.)

Q. Can you point to one of these pictures and show me the discharge end that you talk about.

A. Right there (indicating) that runs along.

Q. And then this dark cloud—that is the photograph, is it, of material discharged from the pipe?

A. Yes, sir.

Q. And that cloud comes through, does it, from the first [420] picture to the last?

A. Yes, sir.

Q. This film that you have been talking about is the one marked Defendant's Exhibit 191, isn't it?

A. Yes, sir.

Q. How long was the discharge pipe with which you were operating in making these films?

A. It was between twenty and thirty feet. I did not measure it.

Q. Twenty or thirty feet from the tank part of the apparatus to the discharge end of the pipe, was it? A. Yes, sir.

Q. How much concrete in cubic feet or yards was discharged in making the whole of this oscillograph record marked—has that got an exhibit mark on it somewhere?

Mr. TOWNSEND.—188.

Mr. WILLIAMS.—188. I think that is wrong. Isn't that 189?

Mr. TOWNSEND.—I beg your pardon, 189.

A. Between one and two cubic yards.

Q. No more closer than that?

A. No, because the gun that was—that it was

(Testimony of Roy Wilkins.)

shot from holds about 2½ cubic yards and it was not quite full when they started.

Q. Was it nearer one yard or nearer two?

A. It was probably nearer two yards.

Mr. WILLIAMS.—That is all.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. I meant to ask you, Mr. Wilkins, when and where and [421] with what apparatus was this test mare?—where this oscillograph record, exhibit 189 was made—was recorded?

A. It was made with the oscillograph in the Maloney's tunnel lining of the Pacific Gas and Electric Company.

Q. And when? A. On February 25, 1927.

Q. With what kind of a gun?

A. February 25, 1927.

Q. Did you say what gun—what kind of a gun was used? A. With a Hackley Gun.

Q. State whether or not it was used in ordinary operation or was it set up?

A. It was used in ordinary operation. The lining that went into the tunnel stayed there. The men that lined it didn't know that this shot was taken.

Q. By Hackley gun are you able to identify that by any of the drawings or photographs that we have here? A. Yes, sir.

Q. Can you, from this drawing I hold in my hand? A. Yes, sir.

(Testimony of Roy Wilkins.)

Mr. TOWNSEND.—The witness refers to the enlargement of the Hackley patent drawing exhibit 180, that is all.

The COURT.—Next witness.

Recross-examination.

(By Mr. WILLIAMS.)

Q. Who was present with you at this recording at the Maloney's tunnel job?

A. Mr. O. W. Peterson was one who helped take the records.

Q. Who else?

A. H. Keisling of the Pacific Gas and Electric Company was there. [422]

Q. Anyone else?

A. There were more there. I do not know their names now. There were workmen around there.

Q. Was Mr. Hackley there? A. He was not.

Mr. WILLIAMS.—That is all.

(Witness excused.) [423]

TESTIMONY OF O. W. PETERSON, FOR DEFENDANT.

Mr. O. W. PETERSON was the next witness called on behalf of the defendant.

Mr. Peterson is the Engineer of General Construction with the Pacific Gas and Electric Company, is 46 years old, and resides at Oakland, California. He is familiar with the methods in vogue in the last few years in lining tunnels and in transportation of materials by compressed air. His first

(Testimony of O. W. Peterson.)

compressed air experience was obtained in Southern California where he did a good deal of underground water measurement and surface water measurement and checked up a great many wells—made measurements where wells were being pumped by compressed air. Subsequently he observed the use of compressed air in the lining of the Twin Peaks tunnel; the Halsey tunnel of the Pacific Gas and Electric Company, and following that practically all the other jobs or a good many other jobs in Northern California. He personally followed the lining of three important tunnels in the last several years for his own company. He also used compressed air in connection with pumping from deep shafts where the pumps were inadequate to raise the water to the surface. He has used air a good deal in driving tunnels and building pen-stocks and doing a great many other construction operations. He did not do water lift work himself but observed the water lift operations in Southern California. He was checking up quantities of water in wells and the water table, and so forth, and observed the way the water came out of the wells. This was in 1902. According to his observations the water generally came out in a uniform aerated stream with an occasional surge over a rather long period. Sometimes there were no surges. Occasionally there would be a few bubbles or something of that sort that would break.

The witness was asked, "Just describe the air lift that was used there" and answered, "Well, the air

was ejected at [424] the low well, and the water aerated and was brought to the surface and came out in a stream of water with air."

Q. In your work in Southern California you said that you made certain measurements in relation to flow, and so forth? What was the general plan followed?

A. You mean of underground flow?

Q. Yes.

A. We put down an upper well—a central one and then on the arc of a circle we put three or four lower wells assuming that the water was traveling down a river valley or something of that nature and we decided to explore the rate at which water flowed forty or fifty feet below the ground surface; also the direction; and we placed electrodes, which are metal rods, in these lower wells with wooden insulators around them and we connected up from the casing to these rods—made a connection there to an ammeter and then we put a salt solution in the well, and we determined the time it took to reach the lower wells and also the direction of the flow, and from that information and from samples of materials obtained we could make an estimate of the quantity and direction of the underground flow.

The COURT.—What is this for?

Mr. TOWNSEND.—It needs just one more question to connect it up and show that it was similar to the wells method employed.

Q. Did the saline solution decrease or increase the conductivity of the water?

(Testimony of O. W. Peterson.)

A. Increased the conductivity. When the salt solution reached one of the lower levels-- [425]

The COURT.—(Interrupting.) I cannot see where this is important in this case. He is speaking, as I understand, of determining the flow of underground current. We want something with reference to lifting and conveying material.

Mr. TOWNSEND.—This is material on the measurement of liquids flowing through.

The COURT.—Proceed and we will see if it is material.

Q. Did that method of measuring electrically the flow of underground currents—was it analogous to or nonanalogous to the method of Mr. Wilkins as just described?

Mr. WILLIAMS.—I object to that as calling for a conclusion. If he wants to state the facts as to what he did, I think it for the Court to state whether it is analogous or not.

The COURT.—What are you trying to prove by this witness?

Mr. TOWNSEND.—I am going to lead up to other points. I want to show that this method followed by Mr. Wilkins was a very natural and proper scientific method of determining the flow and character of—

The COURT.—(Interrupting.) If this witness knows anything about it, ask him.

Mr. TOWNSEND.—I have asked him.

Q. Is that method that you used there like, or unlike or similar to or dissimilar from the method

(Testimony of O. W. Peterson.)

Mr. Wilkins described in determining the flow or character of flow of concrete through a pipe?

Mr. WILLIAMS.—I object on the ground that that is immaterial and on the ground that it is incompetent.

The COURT.—Sustained. If you want to have this witness corroborate the method that the witness Wilkins used in measuring the flow, ask him about it, if he knows. [426]

The WITNESS.—I have observed the operation at Maloneys that Mr. Wilkins testified to.

Q. You did? A. Yes, sir.

Q. And what were the working conditions under which this test was made?

A. The regular working conditions of placing concrete in the tunnel.

Q. How was the concrete coming out of the pipe? In a continuous flow, or otherwise?

A. In a continuous flow.

Q. And was that concrete wet or dry?

A. Wet concrete.

Q. What do you understand to be dry concrete?

A. Dry concrete is that which has to be tamped.

Q. Could dry concrete be discharged through that apparatus? A. No, sir.

Q. What have you to say as to the theory of Mr. Ray that the concrete in the Hackley gun travels through the pipe in the form of slugs?

A. It has been my observation that the concrete comes through in a uniform flow of the concrete and compressed air.

(Testimony of O. W. Peterson.)

Q. What would be the result of a so-called slug action referred to by Mr. Ray?

A. It would plug the pipes.

Q. And what does that do?

A. That stops the works and it is necessary to take the pipes apart and get out the concrete.

Q. What material has about the same handling characteristics as concrete? [427]

A. I would say a sticky mud containing considerable clay, commonly called muck, would be quite similar with a moderate amount of moisture and the similarity would be even greater with the rock embedded in that, commonly called spoil.

Q. Have you ever known of the Hackley gun being used for conveying anything but concrete?

A. Yes, sir.

Q. What material? A. Grout.

Q. And where was that done?

A. That was done on head three tunnel and head four tunnel of the Pacific Gas & Electric Company and the Maloneys tunnel of the Pacific Gas & Electric Company.

Q. Did you see the Hackley gun blow grout?

A. Yes, sir.

Q. And how did the grout come out of the gun?

A. Just the same as the concrete came out.

Q. What did you do with the Hackley gun to make it into a grout gun?

A. Well, the concrete gun has—we used there a six or seven inch pipe which was not convenient to grout with. We used grout with a hose of

(Testimony of O. W. Peterson.)

about two or three inches in diameter and so we simply put a plate on the end of the gun and the nipple welded in that plate for convenient connection of the hose line, and used it as a grout gun.

Q. I show you two pictures here which have been identified as Defendant's Exhibits 181 and 182 for Identification and ask you if you know what they represent?

A. They represent the Hackley gun as used in grouting work [428] at Pit Four tunnel.

Q. Is that used ordinarily in the ordinary course of practice?

A. Yes, sir, where we use the concrete guns for grouting, especially in lava formations where large volumes of grout are required.

Q. Do the pictures show the reducer for the grout?

A. Yes, sir. In the first picture we have the reducer attached to the gun.

Mr. TOWNSEND.—The witness refers to exhibit No. 181 for Identification.

The WITNESS.—In the second picture we have the grout gun on the ground alongside of it.

Mr. TOWNSEND.—We offer these pictures in evidence as Defendant's Exhibits 181 and 182.

(Whereupon photographs showing grout gun were marked Defendant's Exhibits 181 and 182 and received in evidence.)

Q. I show you an enlargement marked Defendant's Exhibit 166 for Identification. Tell us, if you know anything about that?

(Testimony of O. W. Peterson.)

A. This is a grout gun which I used in general grouting work. One of the several different types of machines. I happen to know that it is the Canniff type grout gun, double cylinder conveyor and it is so arranged that grout can be put in one cylinder while the other is being discharged and it permits a fairly continuous operation.

Q. Just mark on there the air inlet to the blow pipe. A. The air inlet is marked "A."

Q. That is on the receptacle?

A. Yes. In this picture we also have an air inlet—

Q. (Interrupting.) "B"? [429]

A. "B," yes, sir.

Q. Is the apparatus of that drawing, exhibit 176 for Identification applicable to or not applicable to the conveying of concrete?

A. It is applicable to the conveying of concrete, yes, sir.

Q. Have you ever seen a machine like that blowing concrete? A. Yes, sir.

Q. Did you have anything to do with making the original—the drawing of this photostat?

A. I had the drawing made.

Q. And is that photostat a correct respresentation of the machine that you have operated?

A. Yes, sir.

Mr. TOWNSEND.—I offer exhibit 176, your Honor.

The COURT.—Is it not in already?

Mr. TOWNSEND.—Only for identification.

(Testimony of O. W. Peterson.)

The COURT.—It may be admitted.

(Whereupon enlarged drawing of grout gun was admitted in evidence as Defendant's Exhibit No. 176.)

Q. Now were you present the other day at the official tests made in San Francisco at the portal of the Sunset Tunnel, September 7th.

A. I was present at tests made at that portal of the Sunset Tunnel.

Q. What machines were tested?

A. We tested a Smith type gun, 1872 patent, and a Canniff type gun.

Q. What were the results of those tests. Just briefly run through them.

Q. Well, we first tested the Smith gun with grout, and then [430] we made up a mixture which corresponded as closely as we could determine to the original Smith mixture and then we put through a regular tunnel mix that was being used. We next put through a grout mix—put a grout mix through the Canniff type gun and then we put a grout mix with rocks and with sand—or I should say with cement and sand and rocks—the maximum size of rocks in the case of the Canniff gun being one inch.

Q. What was the size of the Canniff outlet?

A. The Canniff outlet was two inches.

Q. Did you notice any difference in operation or similarity of operation, or otherwise, between the use of those guns or either of them when using one substance or the other?

(Testimony of O. W. Peterson.)

A. The action was similar in using the different substances.

Q. Exhibit 183, does that look familiar to you?

A. Yes, sir. It is the Canniff type gun with which we made the tests.

Q. That Smith gun is here, isn't it, Mr. Peterson, in evidence?

A. Yes, sir. It is in the basement of this building.

Q. And you say that machine is made according to the Smith patent? A. Yes, sir.

Q. And the Smith patent, that is here in evidence?

A. Yes, sir.

Q. Of 1872? A. Yes, sir.

Q. I will ask you on the photograph. Strike that out. You identify these exhibits—these photographs, exhibits 184 and 185?

A. Yes, sir. 184 shows the Smith gun as it was set up at the [431] time of the test, and Exhibit 185 also shows the Smith gun and the complete discharge line as set up at the time of the test.

Q. Now, will you look the photograph Exhibit 184, the inlet air pipe, and mark it by the letter C?

A. I have marked C at the inlet air pipe.

Q. Will you now mark the point or conduit through which the concrete or other material was admitted to the receptacle A, by the letter "D"?

A. Letter "D" is marked at the intake of the gun where the material went in.

Q. Now, will you just briefly describe what operations were gone through and what part you took in

(Testimony of O. W. Peterson.)

the conducting or in the conduct of those operations in connection with the Smith gun and also with the Canniff gun?

Mr. WILLIAMS.—I object to that, your Honor, as asking for a question that is merely repetition. He stated that once.

Mr. TOWNSEND.—He said that he saw them. I want to know what was done now.

The COURT.—He may answer briefly.

Q. Yes.

A. Just before the test started I went up and read the gauge on the compressor showing that it was 103 pounds to the square inch. I then went down with a couple of men and attended to the mixing of the materials that were put in so that we would know what went into the gun. That was taken over to the gun. The plug in each instance, was put on after the materials were inside. The air pressure was introduced at the top and when the full air pressure was on we opened the cock, opening the valve quickly and immediately [432] the materials were discharged from the gun. I do not want to say immediately, but they were promptly discharged.

Q. That valve that you speak of as a quick opening valve, was that a slide type valve?

A. That was a slide type valve with a handle so that it can be given a quick jerk and opened practically instantly.

Q. Tell us what materials you ran through the Smith gun under compressed air at that time?

(Testimony of O. W. Peterson.)

A. We used first a grout of one part cement and two parts sand mixture. We then used the Smith formula mix of one part cement and one part sand and three parts rock; the parts being by weight and then we did three shifts of the volume by water. That was the mix used as nearly as we could duplicate those conditions.

Q. Was a shot of water run through the machine first?

A. Well, we washed the machine first before we started, to be sure that there was no obstruction of any kind of that sort. As far as that goes, first of all we applied air through and then we applied water and then the grout and then the concrete mixture.

Q. Then what did you do with the Canniff gun?

A. With the Canniff gun—I should say with the Canniff gun we blew air through and then we blew an ordinary grout mixture with the Canniff gun with a grout mix of one part cement and two parts sand, and then we blew a concrete mix consisting of—with rock of the maximum size of one inch.

Q. Did those tests satisfy you as to the practicability or otherwise of the Smith gun as a gun to shoot concrete?

A. Yes, sir. I would say—I would use it on a large job. I would make a bigger gun but just the same type. The [433] principle was satisfactory. It showed that it had the proper structure or proper general proportions and features to shoot

(Testimony of O. W. Peterson.)

concrete. That was what we were interested in doing.

Q. Have you samples of the product that was worked on that day? A. Yes, we have.

Q. Please produce them and explain them to the Court.

A. We have here one sample which is marked here "Mix one one three, Smith patent mix." I marked my initials on it, "O. W. P. September 7, 1927." There was no particular pains taken to preserve the character of the concrete. We just wanted to get a sample of the materials used.

Mr. TOWNSEND.—I offer this as Defendant's Exhibit 193.

(Whereupon sample of mix was admitted in evidence as Defendant's Exhibit 193.)

The WITNESS.—We have here sample No. 2, marked "Rock mix, one, two and a quarter, four and three-quarters referring to the cement, sand and rock, "O. W. P. September 7, 1927." These were samples obtained from materials which were put through the Smith gun at the Sunset Tunnel on September 7th.

Mr. TOWNSEND.—I offer the second sample as exhibit 194.

(Whereupon sample of mix was admitted in evidence as Defendant's Exhibit 194.)

Q. Now, you have referred, Mr. Peterson, to the placing of a reducer on a Hackley gun when you wanted to convert the Hackley gun from a concrete

gun to a grout gun. Have you that reducer here in court? A. Yes, sir.

The COURT.—I cannot see the materiality of all these [434] exhibits. He said that he used a reducer. Now, if he did, would it add anything to show the reducer? If his word is not to be taken as to the reducer, why the exhibit of a reducer would not help any.

Mr. TOWNSEND.—I was carrying out the strict production of the original.

The COURT.—Oh, the infinite detail of all of this I suppose is necessary. We will suspend now until two o'clock.

(Whereupon an adjournment was taken at 12 o'clock M. until 2:00 P. M. of the same day.)

September 14th, 1927, 2:00 P. M.

Court convened pursuant to adjournment.

All parties present.

O. W. PETERSON, a witness called on behalf of the defendant, resumed the stand for further examination:

Mr. TOWNSEND.—Judge, I was just offering the reducer that goes on the Hackley gun at the time that we closed. With the offer of that I will conclude.

The COURT.—How is that?

Mr. TOWNSEND.—I shall just offer a certain reducer that has been used on the Hackley gun, in converting the Hackley gun to a grout gun.

The COURT.—Yes?

(Testimony of O. W. Peterson.)

Mr. TOWNSEND.—And ask that it be marked our next exhibit and conclude.

The COURT.—Well, if there is no objection it may be marked and admitted, although the Court looks upon it as utterly useless. [435]

(Whereupon reducer used on Hackley gun was marked Defendant's Exhibit 191.)

The COURT.—Cross-examine.

Cross-examination.

(By Mr. WILLIAMS.)

Q. How long have you been connected with the Pacific Gas & Electric Company?

A. Off and on since 1913.

Q. Now, you have been speaking of a Canniff grout machine. How early in your engineering experience did such a machine first come to your attention? A. About 1920.

Q. Not before that? A. About that time.

Q. Is that when you first saw one of them used?

A. Yes, sir.

Q. Have such Canniff machines been used on work of the Pacific Gas & Electric Company?

A. Yes, sir.

Q. Now, on June 29, 1916, the Pacific Gas & Electric Company entered into a contract between the plaintiff here or its agent, in accordance with which the Pacific Gas & Electric Company acquired one of the McMichael machines for the pneumatic placing of concrete on division No. 7, South Yuba tunnel for the construction of that tunnel in Placer County, California, did it not?

(Testimony of O. W. Peterson.)

Mr. TOWNSEND.—I object to that as not proper cross-examination.

The COURT.—Sustained.

Q. Mr. Peterson, in what capacity are you employed by the Pacific Gas & Electric Company? [436]

A. I am in charge of their general construction work. You call me an engineer. I am as much a superintendent. I direct the work. We do most of our own work.

The COURT.—Proceed.

Q. Did the Pacific Gas & Electric Company ever use, to your knowledge, a McMichael machine furnished by the plaintiff or its agent?

A. I cannot say as to that. I do not know. I saw a machine of that type but I do not know who furnished it.

Q. On what work did you see that machine?

A. On a job in Placer County, California.

Q. Will you describe that machine?

The COURT.—Well, what is the object of it? I cannot see any.

Mr. WILLIAMS.—I would like to show the interest of this witness. The interest and the bias of this witness. I would like to show that his company first acquired their knowledge of this method of handling concrete by the use of one of the plaintiff's machines. I want to show further that they are now using infringing machines and have been notified of that infringement.

Mr. TOWNSEND.—I object to that.

(Testimony of O. W. Peterson.)

The COURT.—Anyhow he has described it sufficiently. We won't go into the details. He says it is a McMichael machine. That fixes it to be one of your machines.

Q. Now, since that time the Pacific Gas & Electric Company has used so-called Web-Cox machines on some of its work, has it not?

A. One was used, not by the company but by a contractor.

Q. Doing work for the company? [437]

A. Building a tunnel for the company, yes, sir.

Q. Was that machine like the one involved in the suit of this plaintiff against the Ulen Contracting Company of New York and as shown in the drawing which I now call to your attention?

Mr. TOWNSEND.—I object to that as not proper cross-examination.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Will you describe the Web-Cox machine which the Pacific Gas & Electric Company used, as you say?

Mr. TOWNSEND.—I object to that, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Now, since that time, has the Pacific Gas & Electric Company used Hackley machines such as are illustrated on Plaintiff's Exhibit No. 13?

A. Substantially as shown there.

(Testimony of O. W. Peterson.)

Q. Has the Pacific Gas & Electric Company been notified or warned that its use of such machines is an infringement of the McMichael patent in suit?

Mr. TOWNSEND.—Objected to as not proper cross-examination.

The COURT.—He may answer, if he knows.

A. I don't know.

Q. Is the Pacific Gas & Electric Company contributing to the expense of maintaining a defense to this suit?

Mr. TOWNSEND.—That is objected to as not proper cross-examination.

The COURT.—He may answer if he knows.

A. I do not know. [438]

Q. At whose direction have you come here from California?

A. Well, I came—at whose direction?

Q. Yes?

A. Well, I got here at the direction of the company or with their permission.

Q. At the expense of the company or at whose expense?

A. At the expense of the company, I expect.

Q. You are acquainted with Mr. Wilkins, are you, who testified here this morning?

A. Yes, sir.

Q. He is employed, is he, by the Pacific Gas & Electric Company? A. Yes, sir.

The COURT.—If you have any further cross-examination proceed with it, or I will tell the witness to leave the stand.

(Testimony of O. W. Peterson.)

Mr. WILLIAMS.—If the Court please, it will take me less time to look at my notes than it will to fill in with idle questions.

The COURT.—We have no time for you to read every question. We have no time for all those delays.

Q. Well, now, has the Pacific Gas & Electric Company engaged—is the Pacific Gas & Electric Company engaged now in similar tunnel lining or construction work?

A. It is engaged in construction work, but not in tunnel lining at the present time.

Q. Has it been frequently during your connection with the company or since 1920—has it been engaged frequently or more or less continuously in tunnel construction work?

A. Yes to a considerable extent. [439]

Q. Now, what kind of machines has the company used during that period—

A. (Interrupting.) 1920—pardon me?

Q. During the period—all of the period during which you have knowledge of the facts in the concrete lining of the tunnels which it has constructed.

A. From 1920 on or all of the time?

Q. From what?

A. You started out with 1920. I started with them before that or farther back.

Q. Farther back.

A. Just as far back as they used a McMichael type gun on an early job. Through a contractor

(Testimony of O. W. Peterson.)

a Web gun was used and subsequently in recent years the Hackley gun has been used.

Q. Now, are those all that have been used in the pneumatic placement of concrete by the Pacific Gas & Electric Company?

A. Substantially so. We have done a little filling you might say with the grout machine. Whether that would be called concrete filling or not, I can't say.

Q. What do you mean by "filling"? Do you mean by that filling fissures or leaks or cracks?

A. Sometimes we use material a little bit with the grout machine. That has been incidental.

Q. Now, can you say why it is that during all this period—let me ask you first—can you state approximately or generally what the cost of this tunnel lining work has been in which the Pacific Gas & Electric Company has been engaged during the period you have described? [440]

A. I cannot say as to that, except that it has been a considerable amount of money.

Q. Well, does it involve millions of dollars, or less?

A. Oh, I don't know. Less than millions.

Q. Hundreds of thousands? A. Yes, sir.

The COURT.—You have gone far enough along that line. Confine yourself to the examination in chief.

Q. Now, why is it that the Pacific Gas & Electric Company in the placement of concrete in connection with their tunnel work has not our machines? You

(Testimony of O. W. Peterson.)

have designated the Canniff grouting machines and tanks such as this Smith patent apparatus shown on defendant's photograph, Exhibits 184 and 185 if I may see them?

Mr. TOWNSEND.—I object to that, your Honor, as not proper cross-examination as to why.

The COURT.—Sustained. I do not see that it is material.

Mr. WILLIAMS.—Exception.

The COURT.—It will be noted and taken. Proceed.

Mr. WILLIAMS.—That is all.

The COURT.—Call your next witness.

Redirect Examination.

(By Mr. TOWNSEND.)

Q. Just may I ask a question or two. Were you asked by anyone outside of your company to attend here?

A. I was asked by the Storrie Company to attend, yes, sir.

Q. And is all of the concrete lining in the tunnel done by means of the guns here employing compressed air? A. The guns here?

Q. Is all the lining in a tunnel done by means of compressed [441] air shooting concrete?

A. All except that portion which can be poured by gravity directly from cars, which is just the floor and a small portion of the footings at the side of the tunnel.

Q. Was the McMichael gun that you say was used in Placer County a successful gun?

(Testimony of O. W. Peterson.)

A. The company—no, sir.

Mr. TOWNSEND.—That is all.

The COURT.—The next witness.

Recross-examination.

(By Mr. WILLIAMS.)

Q. You were not connected with the company at the time of that work in Placer County, were you?

A. No, sir.

Q. You didn't see it done?

A. I visited the job during its progress.

Q. What is the basis of your saying that it was not satisfactory, not because of your own knowledge of the facts, was it? A. Yes, sir.

Q. When did you acquire that knowledge?

A. At the time of my visit.

Q. In what respect was the work unsatisfactory?

A. Well, they had a great deal of trouble with wearing of pipes and plugs and the costs were a little bit higher than hand work which they were doing in similar tunnels. So they discontinued when they finished this one tunnel and did the remainder of that development by hand. [442]

The COURT.—Call your next witness.

The testimony of William H. Larkin, Jr., taken by deposition at New Haven, Connecticut, commencing at 2:00 P. M. of September 9, 1927, is here reproduced in full in question and answer form. [443]

DEPOSITION OF WILLIAM H. LARKIN, JR., FOR DEFENDANT.

Deposition of WILLIAM H. LARKIN, Jr., taken at New Haven, Connecticut, at two o'clock P. M. of September 9, 1927.

Direct Examination.

(By Mr. GATES.)

Q. Your full name is William H. Larkin, Jr.

A. Yes.

Q. Will you kindly state your age, residence and occupation.

A. Age 56, residence 285 Central Avenue, New Haven, Connecticut, occupation, power engineer; general division of the United States Rubber Company.

Q. State as briefly as you can your engineering experience.

A. A graduate in engineering Worcester Polytechnic Institute in 1893 with degree of M. E. Worcester Polytechnic Institute in 1903. Member of American Society of Mechanical Engineers. Member of Plant Engineer's Club of Boston. Ten years mechanical engineer with United States Lighthouse establishment, Boston. Seven years chief mechanical engineer Frank B. Gilbreth Company, constructing engineer at Boston. Fifteen years mechanical engineer United States Rubber Company, New York City.

Q. Are you the William H. Larkin, Jr., mentioned as patentee in United States letters patent

(Deposition of William H. Larkin, Jr.)

No. 894,813, dated August 4, 1908, and United States letters patent No. 951,754 dated March 8. 1910? A. I am.

Q. Were you the sole inventor of the invention covered by these two letters patent?

A. No. The invention was made in collaboration with [444] J. W. Buzzell.

Q. I show you a photostatic copy of an affidavit bearing at the top the receipt stamp of the United States Patent Office. The date of the affidavit is August 30, 1909, and I ask you if the facsimile of the signature attached to the second page of this affidavit is a facsimile of your signature.

A. It is.

Q. Did you make such an affidavit at that time, namely August 30, 1909? A. I did.

Q. Have you just read this affidavit through carefully, this photostatic copy. A. Yes, I have.

Q. Are the facts therein stated true and correct?

By Mr. COX.—Objected to as calling for secondary evidence and not for facts within the knowledge of the witness at the present time. If facts within the knowledge of the witness are to be introduced in this case, the witness should be asked to state them and not referred to an *ex parte* affidavit made eighteen years ago.

A. They are.

Q. The affidavit refers to certain sketches dated 1904 and 1906 respectively, and I show you, Mr. Larkin, photostatic copies of those sketches, exhibit "A" and exhibit "B." I will ask you who made the originals of those sketches. A. I did.

(Deposition of William H. Larkin, Jr.)

Q. In whose handwriting or hand painting are they? A. Mine.

Q. When did you make those sketches? [445]

A. The originals or the copies?

Q. The original sketches?

A. The originals were made October 14, 1904. I note the date on the sketch marked exhibit "B" is December, 1906, in my handwriting. It is to be noted that the 1904 sketches are concerned mainly with mathematical computation, while the 1906 sketches show the proposed form of the conveyor apparatus. One original sketch was made in October, 1904, the other original was made in December, 1906.

Q. Can you produce the originals?

A. I cannot.

Q. Do you know where the originals now are?

A. I do not.

Q. Are these original sketches the ones you referred to in your affidavits in the following language: "said original sketches I am retaining in my possession for future use in possible litigation of interference"? A. They are.

Q. Did you retain possession of these sketches?

A. I did, for a time.

Q. Then to the best of your recollection what did you do with them?

A. It is my belief that they were forwarded to Emery and Booth of Boston, patent attorneys, which is the same concern now known as Emery, Booth, Janney & Varney.

(Deposition of William H. Larkin, Jr.)

Q. Why did you forward them to this firm?

A. They were forwarded to Mr. Emery at the request of Mr. J. W. Buzzell, my associate, for use in connection with other patent work under way. [446]

Q. Have you or Mr. Buzzell, your associate, requested the firm of Emery, Booth, Janney & Varney to find these sketches for you in their files?

A. Yes.

Q. What was the result of this inquiry?

A. Emery & Booth were unable to find any trace of the sketches, but I understand that they found a reference indicating that they had been returned to Mr. Buzzell.

Q. Do you know what Mr. Buzzell did with these sketches?

A. Mr. Buzzell is not certain that they ever were returned to him, but states that it is quite possible and if so he in all probability turned them over to Ernest W. Marshall, patent attorney of New York in connection with work that Marshall was doing for him at that time.

Q. Have either you or your associate Mr. Buzzell made inquiries respecting these papers of Ernest W. Marshall?

A. I understand that Buzzell asked Marshall to make a search, which produced no result. Marshall stated that many of his old files were destroyed in a fire.

Q. Have you made any effort to locate them at the request of counsel before this deposition was taken?

(Deposition of William H. Larkin, Jr.)

A. I have searched through some old files at my residence and certain rolls of drawings preserved during the last twenty years, but without result.

Q. Have you looked in every place where these sketches are likely to be if still in existence?

A. I have.

Q. With what results? A. No results.

Q. What is your best judgment as to what has become of these [447] sketches?

A. In my opinion, and from experience I have had with the general policy of business houses in handling old files, I should say that it is quite likely that they were destroyed in Emery & Booth's storage, although it is always possible that they reached Marshall and were destroyed in the fire as he mentioned.

Q. Would it be fair then to say that according to your best recollection these sketches have somehow been either lost or destroyed? A. Yes.

Q. I show you photostatic copies of these sketches and ask you if those are true and correct copies of the originals.

A. The original sketches were made between 21 and 23 years ago. The copies were made about 18 years ago. Keeping these facts in mind I can say that, to the best of my belief, and as far as my memory can serve me, the copies are true duplicates of the original in a general way.

Q. The photostatic copies shown the witness are photostatic copies of the blue-prints filed in the Patent Office attached to the affidavit of August 30,

(Deposition of William H. Larkin, Jr.)

1909. I will ask you, Mr. Larkin, if those blue-prints filed in the Patent Office were prepared from the original sketches, either by you or under your direction?

A. My remembrance is that I made these copies at Laporte, Indiana, in 1909 by sketching with India ink or ordinary tracing cloth. The blue-prints were made from these tracing cloth sketches.

Q. Bearing in mind therefore the answer to your last question, can you not now say that these copies are true and correct [448] copies of the originals?

A. No, because the copies are simply prints of a tracing which was made by memory of the original drawing or sketches.

Q. This tracing and these blue-prints you know were to be filed in the Patent Office, is that not correct?

A. My memory of the matter is that I was asked to make the sketches without knowing exactly what was to be done with them. It is entirely probable that at the time I may have known that they were to be used in connection with the affidavit.

Q. I suppose you did your best in making this tracing to reproduce the original drawings exactly?

A. Yes, keeping in mind that what I was trying to emphasize was method rather than detail of machinery.

Q. You have no doubt, however, but that these sketches contain substantially the drawings and the calculations of the originals?

(Deposition of William H. Larkin, Jr.)

By Mr. COX.—I submit that this line of examination has already gone too far and object to it all as incompetent for the reason that the witness can merely state his recollection after a lapse of eighteen years or more and has stated that recollection fully.

A. No.

Q. In 1909 when these tracings were made where were the originals?

A. I have no definite knowledge; as all work at that time was being done by Emery & Booth, presumably in their files. I should say that it would have been reasonable to expect to find them in Emery's files. It is evident [449] that they were not there as I was asked to make copies from memory of these same originals.

Q. So that is 1909 when the tracings were made you did not know where the originals were?

A. No.

Q. Did you make any effort to locate them at that time to your recollection?

A. I do not remember.

Q. In the recent search among your papers which you have testified you have made did you come across these original sketches? A. I did not.

Q. What is your best judgment as to what has become of them?

A. The original sketches were lost as previously described in this testimony, but the tracing made from memory of these original sketches have been lost between the files of Emery & Booth, J. W. Buz-

(Deposition of William H. Larkin, Jr.)

zell and myself. It would be difficult to make any satisfactory guess. It should be kept in mind that all this took place nearly twenty years back.

There is introduced in evidence as Defendant's Exhibit 70 and 70a the sketches, Exhibit "A" and Exhibit "B," dated respectively October 14, 1904 and December, 1906.

By Mr. COX.—Objected to as incompetent and being merely the recollection of the witness of sketches said to have been made by him at dates from two years and eight months to nearly five years prior to the making of these sketches, said recollection based on the sketches themselves which were made subsequent to the filing of the application [450] for the patent in suit on January 14, 1907, and made at that time from memory. This objection also applies to the dates appearing on the sketches marked exhibits 70 and 70a.

Why were you asked Mr. Larkin to make these sketches at the time of the affidavit rather than Mr. Buzzell?

A. I at that time made all the drawings, calculations and did all of the engineering work in connection with the concrete conveyor.

Q. Would it be fair to say that from the beginning you had made the drawings and calculations in connection with the concrete conveyor?

A. Almost exclusively.

Q. At the time you made the copies of the original sketches for filing in the Patent Office how did

(Deposition of William H. Larkin, Jr.)

you fix the dates of October 14, 1904, and December, 1906, respectively?

A. I fixed these dates by consulting my diary, of which I have a series for some thirty-four years, since 1893.

Q. Will you please describe, Mr. Larkin, what the two sketches exhibits 70 and 70a disclose.

A. The apparatus shown on Exhibit "A" consists of a hopper for containing mixed concrete, on the upper part of which hopper is a sealable opening. From this opening leads a pipe intended to convey the concrete to a point where it is to be used. A compressed air receiver for holding air under pressure is shown at the left of the receiving hopper and connected to it by means of a pipe which is indicated. Operation as follows: A batch of mixed concrete is introduced into the hopper through an opening in the top. This opening is then sealed [451] and a suitable valve opened in the pipe leading to the compressed air tank, which allows the air to exert its pressure on the top side of the mass of concrete in the tank. This air pressure forces the concrete downward and into the pipe which is to convey it to the point of use.

The apparatus shown on Exhibit "B" consists of a double receptacle for receiving mixed concrete, it being the intention to use these two receptacles alternately. This for the purpose of saving time; in other words, while one was being filled with concrete the other was being discharged. At the top of these receptacles were placed sealable openings

(Deposition of William H. Larkin, Jr.)

and they were also provided with a mechanical means for closure at the bottom end. From each of these two receptacles led downward a pipe into a Y-shaped fitting, whose two branches led directly into a single conveyor pipe designed to carry the mass of concrete to the point of use. Above the two receptacles is shown an ordinary concrete mixer so arranged as to be capable of discharging into either receptacle or pressure tank as it is marked on the drawing. At the side of the receptacles near the top is shown a pressure pipe, suitably valved, so that at the proper time compressed air can be admitted to the top side of the concrete. It is also intended that steam under high pressure should be used if more convenient. The Y-fitting which leads into the conveyor pipe is also shown provided with a small syphon which is marked I on the plan and shown in detail by a small sketch which is also marked I. The purpose of this syphon was to [452] create a vacuum at this point in the pipe, which might tend to prevent arching of the concrete and choking in the conveyor pipe. This vacuum was to be obtained by the condensation of the expanded jet of steam where it entered the large part of the Y-fitting. The operation of this apparatus was designed to be as follows: The valve at the bottom of one of the receptacles was closed by the lever shown. The top opening was uncovered as shown. Mixed concrete was introduced into this open receptacle. The opening was then sealed by the use of the cover shown. Steam

(Deposition of William H. Larkin, Jr.)

or air pressure was then admitted to the pressure pipe shown near the top of the receptacle. The lower valve on the receptacle was then opened and the pressure on the top of the mass forced it downward and out of the conveyor pipe to the point of application. In the case of a tendency to arch in the tank or receptacle, or in case of choking in the conveyor pipe, steam was supposed to be admitted into Syphon "I" which by means of its vacuum action was supposed to have a tendency to keep the mass in motion.

Q. I hand you, Mr. Larkin, for the purpose of refreshing your recollection, if in fact your recollection is refreshed, printed copies of patents 894,813 and 951,754 and I will ask you if these patents disclose substantially the same idea as these sketches exhibit 70 and 70a. A. They do.

Q. I hand you, Mr. Larkin, a photostat copy of an affidavit dated January 12, 1910, and which bears at the top the receipt stamp of United States Patent Office and I ask [453] to have this marked for identification. Referring to this photostatic copy, Mr. Larkin, I ask you if the facsimile of the signature on page 2 is a facsimile of your signature? A. Yes, it is.

Q. Did you make such an affidavit at that time, namely January 12, 1910? A. I did.

Q. Mr. Larkin, will you please read into the record that affidavit of January, 1910, and state whether or not the facts therein specified are true and correct as of that date.

(Deposition of William H. Larkin, Jr.)

By Mr. COX.—Same objection as to questions before and the facts stated in the affidavit of August 30, 1909.

A. "William H. Larkin, Jr., being duly sworn, deposes and states as follows:

I am the William H. Larkin, Jr., who filed the above-entitled application for patent conjointly with Josiah W. Buzzell on January 25, 1909.

Prior to the 29th day of October, 1906, the idea occurred to me in the course of my duties that concrete or like segregated rock bearing, cementitious material might be conveyed by fluid pressure. Shortly thereafter and prior to October 29, 1906 I discussed this idea with the said Josiah W. Buzzell at South Boston, Mass., and as the result of said discussion we jointly invented and developed the method of conveying concrete and like cementitious material disclosed in the above-entitled application. As a result of said discussion, I made in the United States, sketches on or about October 14, 1904, illustrative of and disclosing the said invention and means whereby [454] the same could be carried out. Blue-prints of said sketches were attached to my previous affidavit filed in this case and executed about August 27, 1909, and marked 'Exhibit A.' Said sketches I am retaining in my possession for future use in possible litigation or interference.

Prior to October 29, 1906, and in conjunction with the said Buzzell, I reduced to practice the said invention in the United States by conveying concrete by fluid pressure in the United States, in the

(Deposition of William H. Larkin, Jr.)

manner described in my above-entitled application and as disclosed in the amendment accompanying the supplemental oath executed on even date herewith. I have carefully read a copy of the affidavit of Josiah W. Buzzell, filed in this case, and know the facts therein set forth to be true. I do not know and do not believe that the invention disclosed in the above-entitled application has been in public use or on sale in this country or patented or described in any printed publication in this or any foreign country for more than two years prior to the filing of the above-entitled application. I have never abandoned the invention disclosed in the above-entitled application.

Further deponent saith not."

A. (Continued.) The facts are true and correct as of that date.

By Mr. COX.—A further objection is made to the affidavits of August 30, 1909, and January 12, 1910, and the exhibits referred to therein, and also to the testimony of the witness relating thereto on the ground that the [455] same are irrelevant and immaterial, it being apparent that the apparatus which the sketches purport to illustrate is essentially different in construction and operation from that of the McMichael patent in suit No. 1,127,660, as the witness has stated in answer to direct questions.

Q. I ask that the Government printed copies of the Buzzell and Larkin patents 951,754 and 894,813 be marked as those copies which the witness has

(Deposition of William H. Larkin, Jr.)

used in refreshing his recollection in answer to previous questions. Refreshing your recollection with anything which in fact does refresh it, can you state when you filed your applications, or when the applications were filed which resulted in the patents to yourself and Mr. Buzzell numbered 894,813 and 951,754 respectively?

A. Yes, the application of the first named patent was filed June 13, 1907, and the one for the second patent was filed January 25, 1909.

Q. What have you used in order to refresh your recollection in answering the last question?

A. I have used the printed dates of application shown on the Patent Office specification.

By Mr. COX.—If the dates given by the witness are to be used to prove the filing dates of the applications for the patents mentioned, the testimony is objected to as not the best evidence, the said filing dates being a matter of record in the United States Patent Office. This objection also applies to the subject matter of the said applications, which is not established by the subject matter of the resulting patents. [456]

By Mr. GATES.—The witness in referring to the printed dates of application shown in the Patent Office specification referred to printed copies of U. S. letters patent 894,813 and 951,754. The evidence as to dates of filing these applications is not being used to establish such filing dates *per se*.

Q. Bearing in mind the statement on the second page of the affidavit of January 12, 1910, that "I

(Deposition of William H. Larkin, Jr.)

have never abandoned the invention disclosed in the above-entitled application" which statement has been described by the witness as a correct statement as of that date, and bearing in mind the filing dates of your applications to which you have just testified, is it not fair to say that at no time between 1904 and the time you and Mr. Buzzell filed your applications for patents Nos. 894,813, 951,754 did you abandon the idea disclosed in those patents?

A. It is fair to say, that we did not abandon the idea during the period mentioned.

Q. I will ask you, Mr. Larkin, to give the numbers of the United States patent issued to you and Mr. Buzzell for Concrete Conveyor.

A. The number of the patent for conveying concrete pneumatically is 894,813. The subsequent patent taken out covering the method is 951,754.

Q. I show you photostat copies of pages 579 and 580 of the "Engineering News" of November 25, 1909, containing an article on "Experiments on conveying concrete through pipes under air pressure," by J. W. Buzzell and William H. Larkin, Jr., and I ask you if you are the [457] William H. Larkin, Jr., therein referred to? A. I am.

Q. Did you in fact on or about November 25, 1909, write an article for the "Engineering News" on the "Experiments on conveying concrete through pipes under air pressure"?

A. Yes, collaborating with J. W. Buzzell of East Orange, New Jersey.

(Deposition of William H. Larkin, Jr.)

Q. Looking at the photostatic copy which has been handed you, can you say whether or not that contains a correct transcript of your said article?

A. It does.

By Mr. GATES.—There is introduced in evidence as Defendant's Exhibit 71 the photostatic copy of pages 579 and 580 of the "Engineering News" dated November 25, 1909, Vol. 62, No. 22.

By Mr. COX.—The exhibit is objected to as incompetent and not the best evidence of the date or the contents of said article, or of any facts stated therein, and further for the reason that the said article purports to have been published more than two years and ten months after the application for the patent in suit. It is further objected to as being a mere *ex parte* statement concerning certain "experiments" made in 1909 containing largely expressions of opinion.

Q. Did you and Mr. Buzzell actually make experiments in 1909 with a device for conveying concrete through pipes under air pressure? A. Yes.

Q. Are the photographs on page 579 of the "Engineering News" article true and correct photographs? [458]

A. Yes, of certain parts of the various types of apparatus which were experimented with.

Q. Do they correctly represent what they purport to represent?

A. They do, understanding that more than one type of apparatus was exerimented with at that time.

(Deposition of William H. Larkin, Jr.)

Q. That is, these pictures do not show all the apparatus you used in your experiments?

A. They do not.

Q. But they do correctly show that part of the apparatus which they purport to show.

A. Yes.

Q. That is, they show correctly part of the apparatus actually used in those experiments?

A. They do.

Q. Will you examine these photographs shown on page 579 (Defendant's Exhibit 71) and state what they represent.

A. Fig. 1 shows one of several hoppers which were tried at different times and used to receive mixed concrete. Fig. 2 shows a stream of concrete leaving the end of the conveyor pipe, which leads from the receiving hopper or tank. Fig. 3 shows an experimental nozzle used at the point of exit of the concrete.

Q. Is the apparatus described in that article and shown in the pictures that you have just testified about, the apparatus of the patents to Buzzell and Larkin Nos. 894,813 and 951,754?

A. Yes, with two exceptions.

Q. What are those exceptions?

A. This machine described in the "Engineering News" article [459] had no syphon and it did have a conical deflector which was placed in the receiving tank or hopper in the endeavor to eliminate arching of the concrete at that point.

(Deposition of William H. Larkin, Jr.)

Q. What air pressure was used? You may refresh your recollection, with anything which does in fact refresh it.

A. Air pressure up to 100 pounds gauge pressure per square inch, but it was found that fifty pounds pressure was the most efficient in this particular case.

Q. How far was the concrete thrown?

A. With this particular apparatus the concrete was conveyed about 400 feet through a four-inch steel pipe.

Q. What was the amount of the charge or quantity of concrete placed in the gun?

A. About ½ cubic yard.

Q. How long did it take the gun to discharge that quantity?

A. When there was no arching in the receiving hopper or plugging in the line it took about five seconds. This however occurred only under favorable circumstances as we encountered great difficulty from the faults mentioned, and in fact the whole study and experimental work at Newark was carried on with the sole idea of finding a way to eliminate arching in the drum and stoppage in the conveyor pipe.

Q. Is this fact of arching in the drum and stoppage in the pipe-lines mentioned in your article in the "Engineering News"?

A. No, naturally.

Q. Did the concrete come out as shown in the

(Deposition of William H. Larkin, Jr.)

photograph entitled Fig. 2 in a solid stream or did it issue in [460] slugs or pistons.

A. A certain number of times when conditions were favorable there was a continuous unbroken discharge of concrete until all the batch had been shot out of the end of the pipe. Whenever the machine operated it discharged the whole mass at one time, and no attempt was ever made to discharge the material in any other way. There were very many trials made at which failure resulted from arching or plugging.

Q. (Continued.) In the whole history of this particular type of apparatus the difficulties mentioned were never eliminated and no attempt was ever made to move the concrete except in a continuous mass, discharging a complete batch at one time.

Q. Did the concrete ever come out in slugs or pistons? A. Never.

Q. Did you use air pressure on top of the concrete only in the gun or did you also use a supplemental jet?

A. We never at any time used any method other than that of applying air pressure at the top of the mass of concrete in the receiving hopper or drum.

Q. Just what did these steps shown and described in the "Engineering News" article of November 1909 (Defendant's Exhibit 71) prove to your mind?

A. They proved that the apparatus as designed and patented was not reliable enough to be a com-

(Deposition of William H. Larkin, Jr.)

mercial article at that time. The experiments also proved to us that considerable further work had to be done to determine the basic method for discharging the concrete from the receiving hopper positively and without danger [461] of interrupting from arching and plugging. And it was on this line that considerable engineering work of this character and experimental studies were made by Buzzell and Larkin subsequently.

Q. Did not the results of these tests, however, convince you that it was practicable to convey concrete by compressed air?

A. These experiments at Newark left us hopeful that this end might be attained but convinced us that we were not at that time on the right track.

Q. What was there about this apparatus that left you hopeful that this end might be attained?

A. We were encouraged by the fact that we did discharge a certain number of batches in a continuous mass successfully. Although we redesigned and rebuilt the hopper several times, and tried numerous shapes and types of deflector *comes* in the hopper, and various mixtures and consistencies of concrete, we never at any time had the apparatus work certainly enough so that we felt that it was a commercial machine and had a chance to bring us in a return for the considerable expenditure running into thousands of dollars which we laid out on the experiments. In conclusion, we hoped that further experiment would be carried on but with some-

(Deposition of William H. Larkin, Jr.)

one backing other than ourselves and with someone else's money.

Q. Referring now to Defendant's Exhibit No. 70, which is the photostat of your sketch dated October 14, 1910, will you state in a very general way if there is any relation between that sketch and Bernoulli's Theorem referred to on page 580 of "Engineering News," for [462] November 25, 1909, being second page of Defendant's Exhibit 71.

A. These sketches show the method by which we applied Bernoulli's Theorem in the calculation of pipe-line friction and resistance so that the necessary pneumatic pressure for use on top of the mass of concrete in the receiving tank could be determined. We also determined by this method the amount of free air capacity required and the necessary mechanical horse-power to move the mass through the length of pipe.

Q. Did you and Mr. Buzzell ever assign your patents 894,813 and 951,754? A. Yes.

Q. To whom?

A. These patents were assigned to the Pneumatic Concrete Conveyor Company of New York.

Q. When? A. The 11th of April, 1910.

Q. Was this assignment recorded in the Patent Office? A. It was to the best of my belief.

Q. Would you recognize a photostatic copy of the same?

A. I should from the signatures and from the name of the attorney who made the assignment, Lewis E. Knox.

(Deposition of William H. Larkin, Jr.)

Q. I hand you a photostatic copy of an assignment purporting to be signed by you and Mr. Buzzell and assigning these two patents and I ask you if that is a copy of the assignment you have just testified about. A. It is.

Q. Is that Pneumatic Concrete Conveyor Company, the assignee, still in existence? [463]

A. It is.

Q. What business has it?

A. Solely the business of collecting royalties from its licensees.

By Mr. GATES.—There is introduced in evidence as Defendant's Exhibit 72 a photostatic copy of an assignment of patents No. 894,813 and No. 951,754 from J. William Buzzell and William H. Larkin, Jr., to the Pneumatic Concrete Conveyor Company, dated April 11, 1910.

Q. Are you connected with the Pneumatic Concrete Conveyor Company and if so in what capacity?

A. I am, being a stockholder, a member of the Board of Directors, and Treasurer of the company.

Q. What are the reasons for the continued existence of this company?

A. For the purpose of collecting royalties from licensees and negotiating for sale of the patents.

Q. You have mentioned licensees under these patents. Will you please state what licenses have been granted under these patents by the Pneumatic Concrete Conveyor Company.

(Deposition of William H. Larkin, Jr.)

A. About 1910 a license was granted and afterwards allowed to lapse, to the Ransome Company of Dunellen, New Jersey. About 1912 a license was granted which shortly afterwards was allowed to lapse to the Pneumatic Placing Company of 2 Rector Street, New York. At a considerable later period, probably about 1920, a license was granted to the Concrete Mixing & Conveying Company of Chicago. Those are the only licenses granted as far as my personal recollection goes.

Q. Is the Concrete Mixing & Conveying Company which you have just referred to the plaintiff in this action? [464] A. It is.

Q. What was the consideration for the license given them?

A. The consideration given was a certain amount of stock in the Concrete Mixing & Conveying Company.

Q. How much stock?

A. They paid for this license 83⅓ shares of about ⅙ of their outstanding stock issue.

Q. Does the Pneumatic Concrete Conveyor Company still own any stock in the plaintiff in this action? A. It does.

Q. How many shares.

A. About 58 shares at the present time.

Q. What has been done with the stock represented by the difference between 82⅓ shares which you at one time held and the 58 shares which you now own?

(Deposition of William H. Larkin, Jr.)

A. They had use for some shares of stock which we took advantage of and sold them back part of our holding.

Q. When you say "they" to whom do you refer?

A. The Concrete Mixing & Conveying Company of Chicago.

Q. How much did you receive per share of stock on this sale? A. We received $100 per share.

Q. In cash? A. In cash.

By Mr. COX.—This entire line of examination relating to the details of the stock of the witness' corporation in the plaintiff corporations is objected to as wholly irrelevant to the issue in this suit, and entirely improper.

Q. What is the amount of the capital stock of the Pneumatic Concrete Conveyor Company?

By Mr. COX.—Same objection. [465]

A. There were 100 shares of common stock issued. That is all.

Q. How much stock do you own ?

By Mr. COX.—Same objection.

A. I own 50 shares.

Q. Is Mr. Buzzell a stockholder?

By Mr. COX.—Same objection.

A. Mr. Buzzell owns 49 shares.

Q. Do you recollect when it was that you sold some of your stock in the Concrete Mixing & Conveying Company back to that company?

By Mr. COX.—Same objection.

A. It was during the latter part of 1925 or early in 1926.

(Deposition of William H. Larkin, Jr.)

Q. What dividends if any has the Pneumatic Concrete Conveying Company received on its stock or shares in the Concrete Mixing & Conveying Company?

A. It has never received any dividends.

Q. What do you know of the financial condition of the plaintiff company?

By Mr. COX.—Same objection.

A. Very little as Mr. Buzzell has handled that phase of the matter from the start.

Q. What is that little that you do know?

By Mr. COX.—Same objection.

A. I know that the company is burdened with a heavy deficit and that any and all money they have received from royalties has gone into the continuous litigation that has been under way since their organization, which is also practically true in the case of Pneumatic Conveyor Company. [466]

By Mr. COX.—The answer is further objected to as hearsay in view of the statement of witness of his lack of actual knowledge.

Q. As treasurer of the company holding stock in Concrete Mixing & Conveying Company have you ever seen or received any of its annual reports?

By Mr. COX.—Same objection and protest is hereby made to this wholly irrelevant and improper examination relating to private affairs of a witness and his corporation and the plaintiff corporation. Defendant's counsel is requested to confine himself to relevant questions and close this examination.

A. Such reports if any have been sent to Mr.

(Deposition of William H. Larkin, Jr.)

Buzzell, president of the Pneumatic Concrete Conveyor Company at his residence in East Orange. I believe that I have been sent copies occasionally but I have no recollection of any particular report or its contents.

Q. Can you say when you received the last one of these copies?

By Mr. COX.—Same objection and it is consented by defendant's counsel that this objection be regarded as standing as to this line of examination.

A. To my recollection an annual report came through during the early part of this year which formed the basis of my impression that they were not in very good shape and that they were laboring under a considerable deficit.

Q. As treasurer of the company holding stock in the plaintiff company can you state what are some of the sources of income of the plaintiff. [467]

A. To the best of my belief their only source of income are from royalties received and the occasion sale of a small block of stock.

Q. From whom does the plaintiff receive royalties?

A. Plaintiff has received royalties solely from its licensees.

Q. And who are they?

A. Their licensees are mainly contractors on tunnel work.

Q. Do you know the Ransome Concrete Machinery Company of New York? A. I do.

(Deposition of William H. Larkin, Jr.)

Q. What business is it in?

A. The manufacture and sale of concrete mixing conveying and placing machinery, together with the manufacture and sale also of a considerable line of accessories.

Q. Is the Ransome Company a licensee of the plaintiff under its letters patent for conveying concrete?

A. The Ransome Company has certain patents of its own in this field. They and the Concrete Mixing & Conveying Company have a mutual agreement by which they share the use of each other's patents and a certain arrangement of the profits. The exact facts of which I do not recollect.

By Mr. COX.—Answer objected to as incompetent and obviously based on hearsay.

Q. As the treasurer of a corporation holding stock in the plaintiff corporation, do *you what* royalties or sums of money the Ransome Company are paying, have been paying, or have paid the plaintiff?

A. There have been some payments, the exact amounts or time [468] of which I have no definite knowledge.

Q. You stated that some time ago, that is in the early part of this year, you received an annual report of the plaintiff company. Do you recollect what that report showed as to the amount of income received by the plaintiff during the period covered by the report, approximately?

A. I do not.

(Deposition of William H. Larkin, Jr.)

Q. What were the reasons inducing the Pneumatic Concrete Conveyor Company to grant a license to the plaintiff in 1920.

A. The reason was largely based on the history of the apparatus as a whole. Directors of Pneumatic Conveyor Company of New York felt that they could capitalize what value there was in the patent by consolidating with a going concern which was the owner of the only successful method for conveying concrete as now practiced, namely the McMichael method.

Q. Is that license about which you have just testified in writing? A. It is.

Q. Is it recorded in the Patent Office?

A. I do not know.

Q. Did the license guarantee any minimum royalty? A. No.

Q. Were you and your company Pneumatic Concrete Conveyor Company intimidated into giving a license to the plaintiff or did the plaintiff voluntarily seek a license from you?

A. No. On the contrary we were for some time previously [469] trying to interest them in our company as we believed that a consolidation would be highly desirable for us, considering the fact that they were a going concern.

Q. Did the plaintiff ever threaten your company with suit? A. Never at any time.

Q. What reasons were given by the plaintiff for taking a license under the patents to Messrs. Buzzell and Larkin?

(Deposition of William H. Larkin, Jr.)

By Mr. COX.—It is understood that the standing objection applies to all of the foregoing questions since consent to the objection standing was last noted, and also to further questions along this line.

By Mr. GATES.—I so understood the situation.

A. The plaintiff company believed that it would be to their advantage to consolidate all the patents in this field and particularly the Buzzell-Larkin patents, not so much because of their value as patents but because of the advertising that they had received and because of the fact that both Buzzell and Larkin had been long known in the engineering field.

Q. I understand that the plaintiff is still operating under this license from the Pneumatic Conveyor Company.

A. They have never operated under the license of Pneumatic Conveyor Company but have confined their entire efforts to the development of the McMichael patent and method.

Q. Is the license from the Pneumatic Concrete Conveyor Company to the plaintiff still in effect?

A. It is.

Q. What is there in the Buzzell and Larkin patent that you think is an improvement over the McMichael patent?

A. Nothing. On the contrary we have admitted consistently [470] that the Larkin and Buzzell patent is unworkable in its present state of development and that the McMichael patent and method is

(Deposition of William H. Larkin, Jr.)

the only means to-day by which concrete can be conveyed through pipes.

Q. And was this your opinion at the time you gave the license to the plaintiff? A. It was.

Q. If that was your opinion at the time you made the license, did you have no compunction or conscience in selling it or taking money for it from the plaintiff?

A. At the time the license was granted to the Concrete Mixing & Conveying Company we believed that the years of development work that we had performed and the history of our experiments were of more than a little value to that company. The Concrete Mixing & Conveying Company on its part was entirely conversant with the history of the Pneumatic Concrete Conveyor Company's apparatus and method. They were more than pleased to absorb the company in the way they did for the sake of the advertising value of the older concern and to obtain the association, engineering advice and assistance of Messrs. Buzzell and Larkin.

Q. Is the plaintiff company a going concern?

A. It is.

Q. You have mentioned previously certain licenses given by the Pneumatic Concrete Conveyor Company to certain persons or firms other than the plaintiff in this suit. Will you please state what the consideration was for these licenses.

A. As a consideration for these licenses the licensees [471] were to pay the Pneumatic Con-

(Deposition of William H. Larkin, Jr.)

crete Conveyor Company certain royalties based on a price per cubic yard for concrete placed.

Q. Do you remember what that figure was?

A. No, I do not.

Q. What were some of the jobs done under these previous licenses?

By Mr. COX.—Objected to as wholly irrelevant unless it is limited to work done under the Buzzell and Larkin patents and not by infringing the McMichael patent.

A. No work was ever done under these previous licenses.

Q. Did you ever receive any money from these previous licenses by way of royalty or otherwise?

A. None whatever to the best of my belief.

Q. What value had these Buzzell and Larkin patents 894,813 and 951,754 at the time when the license was granted by the Pneumatic Concrete Conveyor Company, to the Concrete Mixing & Conveying Company, if any?

A. It was understood at the time that no value resided in the patents themselves but that the engineering experience of Buzzell and Larkin in this field was an asset.

Q. Did you consider that the Buzzell and Larkin patents had only a nuisance value.

A. No, except it was the policy of the Chicago Company to control any and all existing patents in the field.

(Deposition of William H. Larkin, Jr.)

Q. Your sympathies, Mr. Larkin, are entirely with the plaintiff in this litigation are they not?

A. Why practically it could not be otherwise because if the plaintiff loses we personally lose. [472]

Q. As a matter of fact you have discussed your testimony given in this case and also given in your prior deposition in the cases brought by this same plaintiff against Stone & Webster and the Great Western Power Company have you not with plaintiff's counsel.

A. I never have at any length. Some very brief remarks have been passed back and forth in the few minutes just previous to taking my deposition.

Q. On what points were these remarks that you have just referred to?

By Mr. COX.—Objected to as wholly improper and an attempt to cross-examine defendant's witness who has shown the utmost fairness and frankness throughout.

A. The only ideas exchanged were a very brief discussion as to the advisability of allowing in any testimony with regard to financial matters, and largely based on the thought that we are not very proud of the record in that respect.

Q. What points did you discuss in your previous deposition taken at Millville in the Stone & Webster and Great Western case?

A. There was no discussion whatever with the exception of a very brief conversation, not lasting over ten minutes with regard to the differences be-

(Deposition of William H. Larkin, Jr.)

tween the McMichael method and the Larkin-Buzzell method of conveying concrete.

Q. Have you followed the advice of plaintiff's counsel in regard to the character of your testimony?

A. I have not; neither have I been requested to take any particular line of testimony. [473]

There is introduced in evidence as Defendant's Exhibit 73 the photostatic copy of the witness Larkin's affidavit dated August 30, 1909, the original of which was filed in the Patent Office, and an exhibit 73A the affidavit of the witness dated January 12, 1910, the original of which was also filed in the Patent Office. These exhibits have previously been used and referred to by the witness and have been marked for identification.

By Mr. COX.—Objected to on the same ground as the questions relating to their verity put to the witness and as wholly incompetent, irrelevant and immaterial, and attention is called to the fact that these affidavits are dated long subsequent to the application for the patent in suit.

(Direct examination closed.)

Cross-examination.

(By Mr. COX.)

Without waiving any of the objections.

Q. As I understand it these sketches marked exhibits 70 and 70a are photostats of sketches made by you from memory some time subsequent to January, 1907, and probably in 1909 about the time you made

(Deposition of William H. Larkin, Jr.)

the affidavit of August 30, 1909, marked Exhibit 73, is that correct? A. It is.

Q. Have you any way of fixing the date of the sketch exhibit 70a which bears the date "December 1906" and Exhibit "B" than memory? I mean the date of the original which this sketch purports to reproduce as [474] distinguished from other sketches made by you in the period of several months following December 1, 1906.

A. I have no definite way to fix the exact date. My diary shows that in 1906 I was work manager for the United Concrete Machinery Company and actively engaged in this field. It was shortly after that this particular company went out of business, and I went to Laporte, Indiana.

Q. During the period between December 1, 1906, and the filing of your patent application in June, 1907, you made various sketches of apparatus of this general character did you not? A. I did.

Q. As I understand it, the experiments described in the "Engineering News" article of 1909 represented by exhibit 71 did not result in the production of a practically useful device or method of conveying concrete pneumatically. Is that correct?

A. That is correct.

Q. Did these experiments or any other experiments made by you teach how to overcome arching in the vessel or plugging at the pipe?

A. They did not.

Q. Do you understand the apparatus of the McMichael patent in suit and its operations?

(Deposition of William H. Larkin, Jr.)

A. I do.

Q. Does that patent teach a method of preventing this arching and plugging of the concrete?

A. It does.

Q. Did you ever prior to the grant of your two patents [475] referred to in your direct testimony employ a device for conveying concrete pneumatically in which there was pressure behind the mass of concrete in the chamber and a jet or nozzle at or near the outlet of the chamber for directing compressed air into a portion or behind portions of the mass near the outlet?

A. Never at any time.

Q. Did defendant's counsel here present know of your interest in the plaintiff company through your company, the Pneumatic Concrete Conveyor Company before he called you as a witness in this case?

A. I have no definite knowledge. Probably not.

Q. I mean, did he, before he put you on the stand as a witness, know of that interest?

A. That is correct because of conversations we had previous to taking of depositions in which I explained that connection to him.

Q. Is any license granted by the Pneumatic Concrete Conveyor Company under the Buzzell and Larkin patents except that held by the plaintiff now in force, and if not how long since any such license has been in force?

A. There are none at the present time and it is

(Deposition of William H. Larkin, Jr.)
about fourteen years since any previous license has been in force.

Q. Have you received from the plaintiff company or has your Pneumatic Concrete Conveyor Company received from it any royalties or other payments or compensations than the stock mentioned by on direct examination for the license under the Buzzell and Larkin patents? [476] A. No.

Q. Is there any agreement providing for such royalties or other compensations?

A. None other than that the New York Company is to participate in any dividends paid out by the Chicago Company.

Q. Do you not know that any expenses of the Concrete Mixing & Conveying Company, the plaintiff, over and above receipts are taken care of by stockholders of that corporation? A. Yes, I do.

Q. Do you know whether the Ransome Concrete Machinery Company receives anything from the plaintiff company except payments in the nature of partial compensation for business lost by that company on account of the infringement of the patent in suit by others while the Ransome Company is paying royalties for the use of the patent?

By Mr. GATES.—I suppose, of course, that the witness will testify as of his direct knowledge and not from hearsay in answer to this question.

A. I cannot answer that question from my own knowledge.

Q. Then I understand you do not know what the nature or reason may be for any compensation re-

(Deposition of William H. Larkin, Jr.)

ceived by the Ransome Company from the plaintiff?

By Mr. GATES.—I object to the form of this question because it assumes that the witness has testified that he knows that compensation has been in fact received by the Ransome Company. He has just testified that he does not know of his own knowledge either that the Ransome is receiving any money from the plaintiff or [477] any reason why they should so receive.

A. The answer is stated in previous testimony. My recollection has been that money *has* received by the Chicago Company from the Ransome Company, but I have no knowledge of any money, or any reason for money having been paid by the Chicago Company to the Ransome Company.

Q. The sketches marked Exhibit 70a Exhibit "B" show a small pipe running to the conveyor pipe and connected with the upper part of the pressure tank. Is that the same pipe shown in the little sketch at the right-hand upper corner of the top sheet and marked "Detail of syphon." A. It is.

Q. Was that pipe intended to be used to produce a syphon?

A. The object of the pipe was to introduce a jet of steam at that point, which first expanding and then condensing would tend to produce a partial vacuum which, it was hoped, would assist operation of conveying and possibly tend to eliminate arch-

(Deposition of William H. Larkin, Jr.)

ing. This syphon pipe was never actually used by us at any time.

Q. Would it have served any useful purpose if used with compressed air and water.

A. It would have been a detriment if compressed air were used for the reason that it would have put back pressure on the conveyor line at an undesirable point; moreover there would have been no condensation and production of partial vacuum which was the primary idea of the appliance.

Q. Could it have prevented arching or plugging? [478]

A. No, our experience led us to believe that it would have tended to promote arching and plugging and for that reason we did not use it.

Q. Then did you abandon the idea of using this prior to the granting of the patents to you and Buzzell? A. We did.

Q. Referring to this sketch of Exhibit 70a please point out where the arching of the concrete usually occurred in the vessel or chamber.

A. The arching almost invariably occurs at a point where the conical part of the chamber joins the cylindrical part.

Q. Just what is this arching that you refer to?

A. When the pressure is applied to the top of the mass in the receptacle there is a tendency for the *air push* the liquid portion of the concrete down through the solid stone, leaving it high and dry in

(Deposition of William H. Larkin, Jr.)

the form of an arch in the upper part of the chamber.

Q. Where did the plugging of the pipe occur?

A. The plugging of the pipe occurred at no particular point in the conveyor line but was liable to take place anywhere in its length.

Q. Did it occur between the outlet at the conical bottom of the tank and the horizontal portion of the pipe? A. Yes, it did at times.

Q. Does Fig. 4 of the Buzzell and Larkin patent No. 894,813 illustrate your plan for preventing plugging of the conveyor pipe by means of syphons like that shown at "I" in exhibit 70a, the sketches marked Exhibit "B"? A. It does.

(Cross-examination closed.) [479]

Redirect Examination.

(By Mr. GATES.)

Mr. Larkin, the testimony with respect to exhibit 70a, that is the drawing dated December, 1906, has been somewhat contradictory and to my mind a little confusing and I should like to probe your recollection a little further with respect to this matter.

Q. In your affidavit of August 30, 1909, you say that you made certain sketches on or about October 14, 1904, and in December, 1906, and you further say "said original sketches I am retaining in my possession for future use in possible litigation or interference." In answer to a direct question you stated that this reference to original sketches in the affi-

(Deposition of William H. Larkin, Jr.)

davit meant the original sketches themselves and not copies. I ask you to read that exhibit No. 73 and see if there is anything there to indicate that you were filing with the Patent Office in a matter of some importance not blue-prints of original sketches which you had in your possession but blue-prints of copy made from memory some time after the original sketches were made. Do you find any such indication in that affidavit?

By Mr. COX.—Objected to as an attempt to contradict the testimony of this witness given on direct in answer to questions by defendant's counsel, and also as assuming facts not warranted by the records, and attention is called to the statement on the sketch Exhibit "B" that it is a "copy of data furnished J. W. B. for patent appl. Dec. 1906.."

By Mr. GATES.—Attention is called to the obvious and improper attempt to coach the witness in advance of his [480] answer by calling his attention to a paper which is not referred to in the question and which the present examiner would have brought out in its proper order. No attempt is being made to contradict the witness, but an attempt is being made to clear up some little confusion in the direct testimony which has been enhanced by the cross-examination. I'll repeat the question.

By Mr. COX.—I deny any attempt whatsoever to lead the witness, but insist upon defendant's counsel refraining from misleading him. The affidavit refers to the sketch and must be considered with the sketch.

(Deposition of William H. Larkin, Jr.)

Q. I withdraw and reframe the question. Is there anything in that affidavit of August 30, 1909, as distinguished from the sketches attached thereto which would indicate that in a matter of some importance you were filing with the Patent Office blue-prints not of original sketches but of copies of those sketches made some time subsequent to the date of the original sketches themselves.

A. Stretching my memory back twenty years it seems to me that the explanation is as follows: Examining the sketches which state that they are copies of previously made drawings or sketches indicate that at the time of my making the affidavit that the original sketches were no longer in my possession. Reading the affidavit seems to develop a little ambiguity in the use of words. Where in the last line of the first page I stated that I am retaining the original sketches in my possession, I probably intended to convey that I was retaining the originals of the blue-prints which I made at some [481] period subsequently and which were in the form of freehand drawings on tracing cloth made from my memory of the original sketches made in 1904 and 1906. I believe that the whole confusion turns on the words "original sketches" in the last line, which probably should have read "original tracings from which the blue-prints mentioned in the affidavit were made."

Q. Bearing in mind that all I'm attempting to do by these questions is to bring out the real facts of the matter by assisting you perhaps in recollecting

(Deposition of William H. Larkin, Jr.)

events which you have several times said happened many years ago, take exhibit 70 and point out what words on that exhibit indicate to you that those sketches are copies made in 1909 and not originals, made in 1904.

A. On exhibit 70 it gives my letter-head at La-Porte, Indiana, to which are attached these two sketches or photostats. On this letter-head is the signature of W. E. Higgins who drew up the affidavit, who was a lawyer in LaPorte, and whom I knew at that time, all of which indicates that the material was assembled in 1909 at the time the affidavit was made. On the photostat are the words "Copy of sketch and calculations made by W. H. L. Jr. at Boston, Mass., October 14, 1904" which certainly indicates that they are copies and not originals. Again it is evident from examination of the photostat that these are tracings as the dark edge of the blue-print where it overlapped the tracing shows, as is quite common in such cases. All of which seems to check my memory that for purposes of the affidavit in consideration I made some sketches from memory in an [482] attempt to reproduce the data which was contained by other sketches made some years previously.

Q. Perhaps there has been some ambiguity occasioned in this whole matter by the use of the word "originals" and "copies." I do not particularly care whether the drawings and calculations of which these exhibits are blue-prints were in themselves originals or traced copies as the witness has sug-

(Deposition of William H. Larkin, Jr.)

gested. I only want to know when these copies were made. I ask you again, Mr. Larkin, what do you find either in the affidavit exhibit 73 or in the photostat exhibit 70 that indicates to you that those drawings and sketches, whether originals or copies on tracing paper, were actually made, not in 1904, but in 1909. I mean what is there that indicates to you that those sketches of which exhibit 70 is a blue-print were actually made not in 1904 but in 1909.

A. There is absolutely nothing on those sketches shown in the photostat which proves exactly when they were made. However, my recollection of the matter is that most of the old drawings and calculations which were made at Boston, mostly in Gilbreth's office before his failure and suspension of business were destroyed when the office was closed and since I had nothing to do with the concrete machinery business until about 1909 when we began actively to experiment with the concrete conveyor, I feel sure that the sketches shown on the photostat were drawn by me free-hand on tracing cloth from my recollection of the old sketches made several years previously.

Q. In your cross-examination, Mr. Larkin, you stated that [483] during the period between December 1, 1906, and the filing of the Patent Office application in June, 1907, you made various sketches of apparatus of this general character. Do you now recall approximately how many sketches you made during this period.

(Deposition of William H. Larkin, Jr.)

A. No, I have no distinct recollection. Quite a number *of* of sketches were necessary in connection with the application and I had to make them.

Q. Can you now say whether or not these sketches differed substantially from one another and from the sketches made in 1906 in so far as they illustrated the joint invention of yourself and Mr. Buzzell.

A. All sketches that I made during this period had the general characteristic of the patent drawings. I am particularly sure of this because we never had at any time ideas except along this particular line and method.

Q. I understand you to say that from your diary you have been able to fix the dates of one of these sketches as December, 1906.

A. That is so. The way I fixed that date was with the assistance of my diary as 1906.

Q. And you now have no doubt that the tracing made in 1909 is substantially a correct copy of a sketch which you had made in December, 1906.

A. I have a distinct recollection that the free-hand drawing which I made on tracing cloth shown on the exhibit mentioned is a reasonably faithful reproduction of a sketch made during 1906.

Q. Am I right in understanding that you have searched for two things, (1) the original sketches made in 1904 [484] and 1906 and the free-hand reproductions of those drawings made from memory made in 1909, and that you have not been able to

(Deposition of William H. Larkin, Jr.)

find them and that to the best of your knowledge and belief both have been either lost or destroyed?

A. Yes, that is true.

(Deposition closed.) [485]

Mr. TOWNSEND.—With that, your Honor, the defendant rests.

The COURT.—Any rebuttal?

At this point a recess of ten minutes was taken to allow counsel and witnesses to inspect two large exhibits housed in the basement of the court building, after which the following occurred.

Mr. WILLIAMS.—If the Court please, in rebuttal on behalf of the plaintiff we offer the file-wrapper showing the prosecution of the application for the patent to Roy C. Hackley, No. 1,619,297 and ask that it be marked Plaintiff's Exhibit 27.

Mr. TOWNSEND.—Objected to, your Honor, as not rebuttal and as incompetent and irrelevant.

* * *

Mr. WILLIAMS.—If the Court please, we offer as exhibit 12–A the drawings of the Hackley application and description of those drawings as originally filed. The defendant has during its proofs offered in evidence the Hackley patents which issued. What I am offering now is the balance of the file-wrapper and if that shall take—

The COURT.—(Interrupting.) First I want this identified so that I will know it and know where to look for it. You say that it is in evidence, Mr. Clerk?

CLERK.—The plaintiff put it in as part of its exhibit 12, 12–A.

The COURT.—Why is it offered again. It is in.

Mr. WILLIAMS.—I just explained to your Honor that what we offered originally and what was marked 12 or 12–A was that part of the file-wrapper which included the drawings of the application as filed and a part of the specification, or in fact the whole of the specification as originally filed. What I am offering now is the balance of that batch of papers which I have referred to as the file-wrapper showing the prosecution and in answer to the objection of counsel [486] as to its materiality and irrelevancy I shall wish to argue and I offer these papers for the purpose of permitting me to argue that Hackley when he filed that application and when he described his machine, described it exactly in accordance with the mode of operation which we contend it to have. The patent which the defendant has put in evidence shows contains specification ten containing quite a different description.

I wish to show by this file-wrapper now that when this suit was filed Mr. Townsend, the attorney for Hackley, cancelled in its entirety the original specifications describing the thing as Hackley then swore it to be, and substituted a wholly new specification and description which it is quite evident was written with the idea of meeting the exigencies of this suit. I think for that purpose it is entirely material.

The COURT.—Even so, you do not introduce evidence simply to show a thing unless that in itself will have some bearing on the issues in the case.

Mr. WILLIAMS.—It seems to me that it has a very decided bearing upon the issues of the case to show that when there was not the reason of this suit they described the thing that Hackley described in the manner which we contend it was made and the way it operated, and that at the time this suit was filed and as a result, it seems to me it is a fair inference to assume that because of this suit the counsellor in this case modified that description and caused it to issue as the patent which the defendant has put in evidence with a description conformable with the defendant's theory in this case. [487]

Mr. TOWNSEND.—The only necessary answer, your Honor, is that the suit was filed first and the application was prosecuted in the usual way. Nothing of what counsel has said is—

The COURT.—(Interrupting.) I cannot see that it is material what they did to show they changed it because of this suit. Well, that does not mean anything in this case. The objection will be sustained.

Mr. WILLIAMS.—Exception, and I offer to prove the facts as I have stated them in arguing this objection.

The COURT.—I suppose the objection goes to that. Are you objecting to this offer or not?

Mr. TOWNSEND.—I entered an objection your Honor. We objected to the offer your Honor.

The COURT.—Sustained.

(Testimony of Arthur P. Robinson.)

Mr. WILLIAMS.—Exception.

Mr. WILLIAMS.—I would like to offer the balance of that file-wrapper marked for identification as Plaintiff's Exhibit No. 27.

The COURT.—(Interrupting.) Take a single series of numbers. We are way past 27. We are now in the hundreds.

The CLERK.—196 will be the next exhibit number.

Mr. WILLIAMS.—That is Plaintiff's Exhibit 196.

(Whereupon file-wrapper of Hackley patent offered as a whole, marked Plaintiff's Exhibit 196 and its admission denied.)

The COURT.—Proceed if you have anything further. [488]

TESTIMONY OF ARTHUR P. ROBINSON, FOR PLAINTIFF (RECALLED IN REBUTTAL).

ARTHUR P. ROBINSON, a witness previously called on behalf of the plaintiff, was recalled on behalf of the plaintiff in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

He is the Arthur P. Robinson who had previously been sworn and who had testified in this case. He produced drawings and some description of drawings to illustrate the Canniff grouting machine as manufactured and sold by the Ransome Concrete

(Testimony of Arthur P. Robinson.)

Mixing Machinery Company, the typewriting being the regular instructions that go out with some of these machines. The blue-print illustrates the way the witness' company manufactures the Canniff grouting machines and sends them out. The lines shown halfway down the chamber represent a grid or grizzley to keep large stones—if any get into the sand—from dropping into the discharge. That grid is present to prevent them dropping in and closing up the discharge. The witness marks the grid or screen with the letter S in red on Plaintiff's Exhibit 197. The witness stated that he had examined the so-called Canniff machine in the basement of the building which in the record has been given exhibit No. 179, and that he had heard the testimony about the use of that Canniff machine for the pneumatic placement of concrete—the testimony of Mr. Peterson.

Q. Now, will you state whether or not this Defendant's Exhibit No. 179, said to represent the Canniff machine does represent the Canniff machine as manufactured and sold by the Ransome Concrete Mixing Company?

Mr. TOWNSEND.—Your Honor, we object to that.

Q. Or as shown in this blue-print?

Mr. TOWNSEND.—This machine has not been offered as a product of the Ransome Company. It was made back in 1908 or 1909 [489] and was obtained in New York and Mr. McCormick made

(Testimony of Arthur P. Robinson.)

no statement—I don't suppose, in fact, he knows what company built that, so it is not proper.

The COURT.—He may state whether it is the Canniff machine and point out the differences if he can.

A. The machine that I have just examined in the basement, it has the plug over on this side where we have the discharge—where we have the discharge there is a plug in there and evidently their discharge is where we have the plug. In other words, as rigged up, to me it looks like a McMichael machine instead of a Canniff machine.

Q. It has been re-arranged, has it, to conform with the disclosure of the McMichael patent?

Mr. TOWNSEND.—Objected to as leading and not conforming to the facts.

The COURT.—He may answer.

A. Its operations are like the McMichael machine. The way I understand that they have it piped up its operation is like the McMichael machine rather than the Canniff machine. In other words, they have the plug line where we have the discharge line and they have a discharge line in where we have a plug in.

Th COURT.—Well, does that mean that the blow is on one side of the machine in your case and on the other side in the other case?

The WITNESS.—May I explain it to you?

The COURT.—Yes.

A. Here is our discharge line here (indicating) and this is the plug up here (indicating). The plug

(Testimony of Arthur P. Robinson.)

down in the basement is over here (indicating) and the discharge is [490] over there (indicating).

The COURT.—Simply a reversal of the direction of the operation, is that all, or are there any other differences.

A. Reversal in the direction of the operation, yes, sir.

The COURT.—Proceed.

Q. Now, will you look at a copy of the Canniff patent, No. 873,345, which has been offered in evidence and state whether or not the Canniff machine as manufactured and sold by the Ransome Company and as shown in this blue-print, Plaintiff's Exhibit 197, corresponds in its arrangement with the disclosure of the Canniff patent?

A. I think I understood your question right. The machine in the blue-print that I have just submitted is essentially so far as I understand, in its operation this original Canniff drawing.

Q. That Canniff patent. You say "In its operation" but how about its structural arrangement, does it correspond or does it not correspond?

A. We use a different type of door—a different construction. We use this—this has a plate head and we have a cast head and some things like that.

Q. What I am interested in having you testify about is the place at which the jet of air is projected toward or into the material which is to be delivered from the machine—

A. (Interrupting.) The same.

(Testimony of Arthur P. Robinson.)

Q. Does the machine as manufactured by the Ransome Company and as shown on the blue-print, Plaintiff's Exhibit 197, correspond with the disclosure of the Canniff patent?

A. Yes, sir. [491]

Q. Does the Canniff machine, which was offered by the defendant, as Defendant's Exhibit 179, correspond in its arrangement of the piping—the air piping and the inlet of air with the disclosure of the Canniff patent? A. No, sir.

The COURT.—Where is the discharge on this?

The WITNESS.—The discharge is right there and here is the plug here (indicating).

The COURT.—Where does the air come in?

The WITNESS.—You close this valve here (indicating) I guess it is marked 'E'' there. Then you put your sand and your cement and your water in and then you open this. I can explain on this because it is clearer. You open this valve here and that bubbles the sand and water up there and mixes it. Then you close the door and then you have to close this relief valve and open this valve into the discharge line and turn on your air in the top and force it out.

The COURT.—What is the other pipe here?

A. That is the mixing or bubbling pipe. You put your sand and cement in there and you shut that door and of course close the release valve and then you close this door and put the pressure on.

The COURT.—What valve is that which you open?

(Testimony of Arthur P. Robinson.)

A. No. 3 on our blue-print.

The COURT.—You shoot it out when you close this door and put the pressure on?

A. You leave that crack there which opens this a little bit. Here is the complete construction that has been going on with our machines for years.

The COURT.—And you say that this machine down in the cellar is [492] how?

A. The machine down in the cellar—it looks a little bit more like this (indicating). There is a plug, like here, and it looks as if they shoot the discharge out of it, and that is exactly in accordance with the other type of machines.

Q. Now, reference has been made to a concrete placing machine, pneumatic placing machine put out by the Ransome Company prior to the date when it took a license under the McMichael patents in suit. A. Yes, sir.

Q. Have you some drawings or description illustrative of those machines? A. Yes, sir.

Q. You produce the drawing, do you?

A. Yes, sir.

Mr. WILLIAMS.—We offer that in evidence and ask that it be marked Plaintiff's Exhibit 198.

Mr. TOWNSEND.—May I see it?

The WITNESS.—Here is the instruction sheet that has gone with it for years.

Mr. WILLIAMS.—We offer the instruction sheet and ask that it be marked Plaintiff's Exhibit No. 199.

(Testimony of Arthur P. Robinson.)

(Whereupon blue-print of the Pneumatic Placing machine of the Ransome Company was admitted in evidence and instruction sheet accompanying same was admitted in evidence as Plaintiff's Exhibit 198 and 199 respectively.)

The COURT.—What is this, now?

Mr. WILLIAMS.—This is the pneumatic placing machine put out by the Ransome Company and named, as we shall show—what was it—

The WITNESS.—The Ransome Canniff. We called it the Ransome Canniff for a while, and we called it the Ransome [493] Pneumatic Mixer and Placer.

The COURT.—Proceed.

Q. Now, does this machine have its air jet arranged as disclosed in the Canniff patent or as disclosed in the McMichael patent?

A. As in the McMichael patent, directly opposite from the Canniff patent.

The COURT.—What is that?

The WITNESS.—As in the McMichael patent, directly opposite from the Canniff patent.

Mr. WILLIAMS.—That is all, Mr. Robinson.

The COURT.—Cross-examine.

Mr. TOWNSEND.—No cross-examination.

(Witness excused.) [494]

TESTIMONY OF R. C. OXENHAM, FOR PLAINTIFF (RECALLED IN REBUTTAL).

R. C. OXENHAM, a witness previously called on behalf of the plaintiff, was recalled in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

The witness states that he is the Mr. Oxenham who previously was sworn and who testified in the case.

Q. When you observed the operation of the pneumatic placing apparatus in the Skagit River Tunnel and the operations there of the Hackley machine, did you observe whether the concrete forming materials were of a consistency such as that they stood in a pile with sloping sides or whether those materials would, of their own flow assume a level condition? A. Stood in a pile.

Mr. TOWNSEND.—I would object to that as not proper *sur*rebuttal. Requiring this witness to piece out what they should have done on direct, if it had any bearing, and particularly that this witness is not qualified. He has shown himself utterly disqualified to testify in regard to these matters and it is not proper *sur*rebuttal.

Mr. WILLIAMS.—The defendant called as witness to testify whether that concrete was, as he called it, wet concrete, and I think it is material.

The COURT.—I think as rebuttal it is competent. Evidence that ought to be produced in

(Testimony of Shirley Houghton.)

chief may still be used in rebuttal. The objection is overruled. [495]

Mr. TOWNSEND.—I have one suggestion more. They are attempting to contradict and rebut their own witness,—the practical man who ran this machine and who has said that the concrete in the Skagit Tunnel, the Hackley gun—came out in a soft flow.

The COURT.—Who is that?

Mr. TOWNSEND.—The workman—the foreman.

The COURT.—Well, they are not bound by the statement of one witness if they are so unfortunate as to have a conflict in their own evidence. If that is the case, the Court may not be able to determine which to believe and believe neither.

Mr. WILLIAMS.—That is all.

Mr. TOWNSEND.—No cross-examination. [496]

TESTIMONY OF SHIRLEY HOUGHTON, FOR PLAINTIFF (RECALLED IN REBUTTAL).

SHIRLEY HOUGHTON, a witness previously called on behalf of the plaintiff, was recalled in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

Q. You are the Mr. Houghton who has been sworn and previously testified in this case, are you?

A. Yes, sir.

The COURT.—What is the name?

(Testimony of Shirley Houghton.)

The WITNESS.—Houghton.

Q. Will you state if you know whether the vertical type of McMichael machines are still in use, and if so, where and to what extent? A. Yes.

Mr. TOWNSEND.—That is irrelevant and immaterial and not proper *sur*rebuttal.

Mr. WILLIAMS.—The effort of the defendant was very clearly to show by several witnesses that these machines were unsuccessful and failures and the inference surely was that they were not in use.

The COURT.—He may answer. Overruled.

A. Yes. There are several of them in use as of the present date and have been for a period of ten years on the Southern Pacific Railroad at various locations and on the Union Pacific Railroad.

Q. You heard Mr. Peterson's testimony, did you?

A. I did.

Q. Will you state whether or not a McMichael machine furnished by the plaintiff or its agent was delivered to the Pacific Gas & Electric Company under a contract entered into in 1916 and used by it in construction work and in [497] the pneumatic placement of concrete in Placer County, California, following that date.

Mr. TOWNSEND.—Objected to as not proper rebuttal and as irrelevant and immaterial and as attempting now to get from this witness testimony which the Court ruled out.

The COURT.—What is the object?

Mr. WILLIAMS.—I wish to show that the Pacific Gas & Electric Company whose employees are

(Testimony of Shirley Houghton.)

here expressing their opinions on various matters of operation and so on, first used pneumatic placing machines in its work which were furnished by the plaintiffs and that the plaintiff furnished that apparatus; that that was—I think there will be no evidence certainly, to show that they ever used any such apparatus prior to this furnished by the plaintiff here.

The COURT.—I cannot see that it is at all material. Objection sustained.

Mr. WILLIAMS.—Exception.

Q. I will ask you also whether the Pacific Gas & Electric Company paid royalties for the use of a McMichael machine so furnished?

Mr. TOWNSEND.—Objected to.

Q. In or about 1916 for the pneumatic placement of concrete in Placer County, California?

Mr. TOWNSEND.—Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Do you know whether subsequent to that date the plaintiff or its agent endeavored to lease to the Pacific Gas & [498] Electric Company McMichael machines for the pneumatic placement of concrete?

Mr. TOWNSEND.—Objected to as not rebuttal.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you a further question, whether, since the use of the McMichael machine in the Placer County job—the Auburn Tunnel—in about

(Testimony of Shirley Houghton.)

1916 or '17 the Pacific Gas or Electric Company has used McMichael machines furnished by the plaintiff cr its agents in the pneumatic placement of concrete in construction work which it has since been interested in?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

The COURT.—Proceed.

Mr. WILLIAMS.—That is all.

The COURT.—Cross-examine.

Mr. TOWNSEND.—None.

The COURT.—Your next witness.

(Witness excused.)

Mr. WILLIAMS.—We will call Mr. Ray. [499]

TESTIMONY OF FREDERICK RAY, FOR PLAINTIFF (RECALLED IN REBUTTAL).

FREDERICK RAY, a witness previously called on behalf of the plaintiff, was recalled in rebuttal.

Direct Examination.

(By Mr. WILLIAMS.)

The witness testified that he is the Frederick Ray who had previously been sworn and testified in this case. He stated that he had heard all of the testimony of all of the defendant's witnesses as to the mode of operation of the McMichael apparatus, the apparatus of the patent in suit.

(Testimony of Frederick Ray.)

Q. I wish, Mr. Ray, that you would state first whether you have made an investigation and observation record—whether you made an investigation and observations, anything that would determine the facts as to the mode of operation of this apparatus in so far, particularly, as the slug formation of the segmental delivery of the concrete materials is concerned.

Mr. TOWNSEND.—We object to that as not proper rebuttal. This witness was on the stand and testified directly on this matter. They are trying now to rehash and reconstruct their primary case and it will leave us at a decided disadvantage. We have answered all that they have set up now, and now they bring this in.

The COURT.—As a rule the plaintiff generally puts in the patent and some evidence of infringement, and that is all, and then the defendant attacks the process of patent and then in rebuttal the plaintiff tells about the process of his patent. Overruled.

The witness stated that he had observed quite a number of the McMichael machines in operation and determined their mode [500] of operation as well as he could by general observation of the discharge and hearing slugs passing through and observing pressure gauges in certain places. These particular machines were in ordinary commercial operation. That in order to determine the matter more scientifically, if possible, he had set up a small McMichael machine in Chicago last spring

(Testimony of Frederick Ray.)

and had attached to it certain recording gauges and also a special impact recorder so as, if possible, to determine the impact of these slugs passing through the pipe. This apparatus was operated for a number of days and numerous tests made of the various conditions of which he has records, and to his mind these tests demonstrated fully the opinion which he had previously formed from the operation of these commercial machines as to the mode of operation and the action that took place in conveying the concrete through the pipes.

Q. Now, would you describe quite fully the apparatus which you employed in making these scientific determinations as you have said?

Mr. TOWNSEND.—It is understood, your Honor, that our same objection goes to all this?

The COURT.—It may.

Mr. TOWNSEND.—And we will also object that these experiments that he made were utterly *ex parte* without notice to the defendant or its counsel.

The COURT.—Well, the Court will bear that in mind.

The gun used for these experiments was of the usual McMichael type, that is, similar to that shown in the patent in suit, and it was erected in a vacant shop and he had a photograph which illustrated this particular machine as it was erected in the place, which photograph was then introduced [501] as Plaintiff's Exhibit 200, over objection of defendant.

(Testimony of Frederick Ray.)

The witness then produced a second photograph showing a little more clearly the various valves on this machine which was then introduced as Plaintiff's Exhibit 201. The witness then produced a third photograph which shows the line leading from the machines and the connection of one of the recording gauges to the pipe-line. This photograph was offered as Plaintiff's Exhibit 202. The witness stated that the photographs show the general arrangement which consisted merely in the concrete conveyor or the gun being set up on the floor of this job and a horizontal pipe of 60 or so feet in length being carried over to a wooden box in which the mixture was discharged with one recording gauge connected to the chamber of the conveyor above the concrete mixture, which the witness called in these tests, "Gauge No. 1." The next gauge was connected to the top of the discharge pipe, something like 15 or 18 feet from the chamber. This gauge he called "Gauge No. 2." The third gauge was connected about 2 feet from the end of the discharge pipe and this he called "Gauge No. 3." These gauges were the ordinary type of Bristol recording gauges except that they were arranged to have a rapid rotation of the chart but even as furnished he found that the rotation of the chart was not rapid enough so he removed the escapement of the ordinary clock movement which rotates the chart so that they rotated freely under the action of the spring which increased their rate of rotation very materially. He produced a photograph

(Testimony of Frederick Ray.)

which simply shows these three gauges grouped together and the impact recording device for them. This photograph shows the general type of these gauges. It was then offered in evidence as Plaintiff's Exhibit 203. One of these gauges having a special time recording mechanism attached to it was introduced as Plaintiff's Exhibit 204. [502]

The witness stated that in using these gauges and the impact recording devices he desired to have an exact record of the time during which the test was going on so he had a pendulum which beat half seconds and which controlled the electric circuit in series and in this circuit there was placed the mechanism for placing the little mark upon the chart of the impact recording gauge and upon two of the pressure recording gauges, which gauges are numbers two and three.

(Whereupon timing mechanism was admitted in evidence as Plaintiff's Exhibit 205.)

The witness then stated that by the use of this timing mechanism there was marked upon each of the charts half second marks at the same time that the other indications were being recorded. These half second marks were made simultaneously on all except the chart on gauge No. 1, which was the chart that was attached to the top of the chamber.

The COURT.—What does all this lead to? You are going into a great deal of detail about these gauges.

The witness stated that it leads to the records which we produced by these gauges, which show

(Testimony of Frederick Ray.)

the pressure impulses passing through the pipe-line and which show the impact of the slugs as they left the pipe-line, clearly indicating to the mind of the witness that the concrete was conveyed through the pipe-line in the form of definite slugs. The witness produced five graphs. These were drawn up from the original gauge readings of these gauges. He reproduced those readings upon a single sheet in each case so that the relative locations of the variations of the pressure can be determined. On the bottom are placed numerals of the time in seconds from the beginning of the observations. The lowermost curve shows the pressure variation [503] in the chamber above the concrete.

The next curve, which is marked "Pressure Gauge No. 2," shows the variation in the pressure at the top of the pipe-line about 15 feet from the discharge of the chamber. The graph marked "Pressure Gauge No. 3" shows the pressure variations in the pipe-line about two feet from the end. The top line, which is marked "Impact recorder," shows the records of this impact recorder—that is, each one of these little marks represents the impact of a slug and is recorded upon the paper chart and which have been transferred to these charts. There are five of these sheets. They represent five different tests or five different discharges and they vary somewhat. No two charges go out of the gun in exactly the same manner but in the same general manner they will have the same characteristics—the details are different. Whereupon the charts marked by the

(Testimony of Frederick Ray.)

witness were offered collectively as Plaintiff's Exhibit 206.

Mr. TOWNSEND.—In addition to the objections already made, your Honor, to this, we object to these charts as not true and correct copies. He has stated that they are his own conceptions of his original records. Those are secondary and not proper.

The COURT.—You say you made these from something else?

The COURT.—The objection will be overruled.

These large charts are made up by copying the original records. Each of the original curves is on a separate sheet because they were taken on separate gauges. Of necessity they had to be. Then to be able to compare them in relation to the time, it was necessary to put them on the same base so each record here was transferred to a single sheet. The witness has the originals here of all of them. The gauge charts and the [504] impact recorder charts are all in a box and they are all collectively offered as Plaintiff's Exhibit 207. There are sixteen original charts of the gauges. Those lines on the charts are drawn on smoked paper. The charts were smoked so that the marking could be done by a very light pressure on the pen-point so as to make the gauge as sensitive as possible to small variations. Whereupon the box containing six rolls and fifteen dials was admitted in evidence as Plaintiff's Exhibit 207.

(Testimony of Frederick Ray.)

The witness produces the impact responsive and indicating mechanism which he employed and states that it is in the form of an elbow placed on the end of the discharge pipe so that the concrete came in one opening and turned through at an angle of 90° and was discharged out of the other opening. This impact recording device consists of a rubber diaphragm supported around the edges, against the center of which rests a plunger which, in turn, is connected up by suitable leverage and that operates a pencil in contact with this moving strip of tape. This surface of the diaphragm was on a plane of 45° from the axis of the entrance to the elbow. The result of that was that as each slug came through the pipe it impacted against this diaphragm as it was turned around through this 90° angle before it left the angle. At each impact it moved this lever and there was a mark recorded upon the paper which was drawn through at a uniform rate. Whereupon the impact recording apparatus was admitted in evidence as Plaintiff's Exhibit 208. The witness selected one of the original records formed by this impact responsive mechanism and pointed out to the Court that this particular one is marked "No. 1 impact recorder, March 4, 1927," with the signature of the witness upon it. There are two lines—pencil lines running lengthwise on this tape —the lower one [505] being the indication of the timing mechanism. At every half second there is a beat shown which indicates the time during the test. After a number of these beats occur, there is

(Testimony of Frederick Ray.)

shown a series of wavy line movements of the pen pointer in the upper line, which is the line made by the impact recorder. During the first part of this movement of tape this line is perfectly horizontal and during some of this period the air had been turned on to the gun. In due time a slug arrived at the end of the pipe and left its impression on the impact recorder and it is recorded here on this in the form of a wavy motion of this line. There are a series of waves coming quite close together here (indicating). In other words, there are quite a number of slugs coming one after another. It is a very usual operation of these devices. Then after a period of a quarter of a second there were a couple of slugs that came along close together, maybe a small one between and maybe after another quarter of a second another one. Then there is a period here of two seconds or so before there is another appearance of a slug. Then a small one comes and several larger ones there. Then after another half second there are a group of small slugs and then in a quarter of a second several groups of larger ones. There is another second before there is any material group of two or three coming along and another half a second a few more and that, with the exception possibly of a few small ones, is the end of the operation. So all of these tests show results similar, the particular time at which the slugs came and the difference in each case. The witness made several of these records. Five of

(Testimony of Frederick Ray.)

them were produced, one additional being a calibration of the impact recorded.

The witness states that he is familiar with the method of taking motion picture exposures, that he has a motion [506] picture camera of his own and takes pictures from time to time and is generally familiar with it. The witness states that in his opinion motion picture films such as those offered by the defendant here as 191, 192 and 190 are not rapid enough or adequate to show anything about the movement of the slugs issuing from the end of the conduit type of pneumatic concrete placing apparatus. He does not know exactly with what rapidity these particular pictures were taken but the ordinary moving picture camera takes an exposure of about 1/30 or 1/32 of a second. There are sixteen of these per second and such exposures are not rapid enough to show any particular indications as to the discharge. The movement of the concrete and the rocks and the water out of the discharge pipe is so rapid that in order to photograph so that it would be even approximately—appear even approximately stationary—would take a very short exposure. He doubted if a thousandth of a second would be sufficient. It would be even less than that. There is no ordinary moving picture camera that is capable of doing anything of that kind.

The witness heard the testimony of Mr. Wilkins and, after examining Defendant's Exhibit 189, which is an oscillograph record, stated that he is

(Testimony of Frederick Ray.)

familiar with oscillographs and their use in a general way and that in his opinion the reason why one of the lines on defendant's oscillograph record 189 is broader than the other is apparently a difference in the focusing of the light beam.

Mr. TOWNSEND.—We object to that, his testifying upon the subject. He has shown no qualifications so far.

Mr. WILLIAMS.—Perhaps that is right. I will endeavor to qualify him further. [507]

The witness stated that he had taken a degree in physics. He states that an oscillograph is an instrument for recording the variations of current. Usually it is a method of recording. Usually the method of recording its operation is by a light beam which is deflected back and forth by a mirror which is mounted upon oscillating parts of the system or instrument. That, he presumes, was used in this case. The witness has used some instruments similar to this himself. He believes that the reason that the lower line on the oscillograph record is narrower is because the light beam was evidently focused much sharper than in the case of the upper line. In looking over the blue-print of the defendant's test apparatus by which the oscillograph record was made and in listening to the testimony, it was the understanding of this witness that the broad line was the indication at the bottom of the pipe and the sharper line with the greater variations in it, the indications at the top of the pipe. In the witness' opinion, a narrow line indicates the

(Testimony of Frederick Ray.)

minute variations of current better than does the broad line. The broad line would have the tendency of cutting out many of the small ones, throwing them out.

The witness was asked, "Will you state from your observation and experience with this pneumatic placing apparatus whether the so-called slug or segmental formation is more pronounced in a long discharge duct or in a short one and in which they can be best observed and determined?" He answered, "They occur in either a short one or a long one in my opinion but I think there would be a tendency for the slugs to be more pronounced in a long line. The resistance to the movement of the concrete becomes greater as the line is lengthened out. That, in turn, would tend to build up a greater pressure at the discharge of [508] *of* the gun, which, in turn, would have the tendency of making the slugs larger and more pronounced."

The witness then stated that, in practice, the distance that concrete is conveyed of course varies from a comparatively short distance, possibly 50 feet, up to ordinarily several hundred feet and in some instances several thousand feet. The gun is apt to be placed in a position and then as the lining is completed, of course, the distance from this gun to the forms is changing all the time.

Q. Is a discharge duct or pipe twenty feet long, such as was used in making this oscillograph record, offered by the defendants—defendants' exhibit—of sufficient length to exhibit in the most

(Testimony of Frederick Ray.)

pronounced, or in a fairly pronounced fashion the plugs or segmental formations of the discharge conduit?

A. No, it certainly would not be representative of the effect which would occur in a pipe several hundred feet long. The resistance to the discharge of the concrete is not sufficient.

Mr. TOWNSEND.—I will call attention, your Honor, to the fact that the testimony of Mr. Wilkins was not that the pipe was twenty feet long, but that he recorded a travel of twenty feet of concrete in the length of that oscillograph.

The WITNESS.—It is twenty seconds, this is.

Mr. TOWNSEND.—If necessary, I will stipulate that the pipe-line was sixty feet long without recalling Mr. Wilkins.

Mr. WILLIAMS.—Well, if the Court please, I think that we are meeting their testimony.

Mr. TOWNSEND.—I should say eighty feet as shown on the drawing in evidence.

The COURT.—Proceed.

Mr. WILLIAMS.—I do not by my silence assent to the stipulation, [509] of course, or to the proposed stipulation.

Q. Now, will you examine carefully this oscillograph produced by the defendant and state, whether, in your opinion, it exhibits in any degree the formation of slugs or segments?

A. I think that it certainly does.

He states that if one refers first to the fine line which is at the top of the pipe, it is seen that this

(Testimony of Frederick Ray.)

line consists of one continuation of small oscillations with an occasional large one. Now, these small oscillations have been attributed to the difference in the electrical resistance of the concrete within the pipe—that is, the body of the concrete itself depending upon the relative amount of air pressure. In his opinion this resistance, which undoubtedly is varying, is due to the surface coating within the pipe by water and cement extending from one electrode to the other and which resistance would be continually changing due to the air itself flowing along that pipe and causing in effect, waves in that surface material. That is, waves in the liquid itself upon the surface just as waves are created upon water surface by air going over it—ripples, if you wish to call them that. That would account for the slight variations in a more reasonable manner to his mind than thinking that the current was passed directly through the pipe through a body of concrete and air. Now, when a slug of concrete comes along there is more or less of a deposit. A little thicker deposit momentarily at least between the electrodes and the resistance decreases with an increased flow of current, which is indicated upon this chart. In the case of the thick line which is at the bottom of the pipe the coating there naturally would be thicker than at the top due to the gravity effect and, as a [510] result of this chart, we see that the resistance is less and a greater deflection occurs.

(Testimony of Frederick Ray.)

This thicker line also indicates in the same way these slugs. The witness can see nothing in this chart which would dispute the slug theory whatever to his mind. The witness states that the impact recording device which he made use of only operates by the actual impact of some substance upon it. That fact he has demonstrated and proven very clearly by collaboration. The apparatus is so constructed that pressures up to eighteen pounds—that is a static pressure within the pipe up to eighteen pounds, did not affect the impact apparatus. It did not make a mark upon the tape. The pressure at that point was less than eighteen pounds, so that the only thing that did make a mark was the actual impact of some body for weight and inertia.

In the case of gauges they actually show a variation of pressure. Nothing else could affect them except pressure. The presence of the pressure—a pressure wave passing through the pipe to his mind is perfect proof that a slug is passing through because when the pipe was emptied, there was no particular pressure within the pipe—none could be maintained.

Q. Will you state whether the test apparatus used by you was sensitive in any degree whatever to ripplies of water or moisture passing through the duct or to any variations in the amount of water or moisture on the duct wall from time to time?

A. No, those things did not affect the readings of either the gauges or the impact apparatus.

(Testimony of Frederick Ray.)

Q. Would they so affect the apparatus employed as described by the defendant?

A. I consider that it is those effects that are shown mostly [511] in this record.

The COURT.—How many of these slugs did you claim moved a second?

The WITNESS.—There may be twenty or thirty come out in a second. Then there will be an elapse of a second or two when none will pass through. Then there will generally come a group of two or three more in the next quarter second. The reason of that is the feeding of the concrete out of the chamber and into the pipe. That concrete sometimes feeds rapidly and sometimes feeds slowly, depending on how the rocks have crowded into that opening. It is a matter of chance. Sometimes quite a plug of concrete will come out before the rocks will kind of block it up, and another time only a small amount will come out. That is a universal observation that anyone will note in these machines.

The COURT.—Will the discharge be a continuous stream?

The WITNESS.—When there is a bunch of slugs coming out it will appear as a continuous stream for that moment, but there is often a second or two seconds when nothing whatever will come out of the discharge. It is impossible for the naked eye to detect the individual slugs of material issuing from the discharge end of the duct. Of course, it is very easy to detect the several groups of slugs. The

(Testimony of Frederick Ray.)

velocity of the concrete leaving the discharge is a good deal higher than flowing through the pipe as a rule because the pressure blows these slugs right up to the discharge and is then suddenly released and causes the material to move very rapidly—possibly at a speed of a couple of hundred feet a second right at that point. It is very rapid. He has heard the air coming out behind the slug make a noise like the dull boom of a cannon a long distance off, the sudden explosion of that air. [512]

Q. Now, Mr. Ray, I want to take up another subject, namely, the prior art patents and publications which have been offered here by the defendant. Have you read those patents and publications offered by the defendant and looked at the drawings?

A. I have read all of the patents and most of the publications. I think I have gone over all of the publications but I am not quite certain as I did not have the time, quite, to finish the list.

Q. Have you looked to some extent at all, or are there some that you failed to see?

A. I think I have looked at all. I looked at everything that we had. I believe that covered all that were actually offered here.

Q. But you haven't read every word of every one of the publications?

A. No, but practically every word of most of them.

Q. Did you see enough of the substance of the others from a casual glancing or reading, or what-

(Testimony of Frederick Ray.)

ever you did, to have an idea which you are willing to express as to the substance of those disclosures?

A. Yes. I went through them and picked out the parts which appeared to have a bearing on the matter in hand and read that portion at least. [513]

Q. Now, in the question which I am about to ask you relative to the prior art, I wish you would assume that the public use by Shailer, McCormick and McIllvrid at New York, as attempted to be shown by the defendants' depositions involved a use in which fluid grout was pumped into the voids in concrete construction by means of a Cantiff grouter or by means of a McIllvrid grouter. I wish you would assume that the public use by R. A. Shailer and Thomas McCormick at New York involved,—that is, as covered by the depositions offered by the defendant—involved the use of a caisson which was sunk under the pressure of compressed air in which men worked on the floor of the open bottom of the caisson at it was lowered and that a discharge pipe extended outwardly from nearly the bottom of the caisson and sand and other material dug up by the workmen were blown out through the discharge pipe by compressed air in the caisson.

I wish you would assume that the prior use No. 1, by the Union Sulphur Company and others at Sulphur, Crowley and New Orleans, Louisiana, involved the use in which water and oil and sand and gravel were pumped from wells by air lift pumps, the sand and gravel being held in suspension in the

water or oil and carried along by the flow of the liquid, as much as fifty per cent of sand [514] being entrained on some occasions, and that muddy water and mud were sometimes pumped from a hole thirty feet deep by air lift pump.

And I wish that you would assume that the prior use, No. 2, by the Union Sulphur Company, at Sulphur, Louisiana, involved the use in which sulphur was melted by the application of hot water circulated in deep wells. This melted liquid sulphur having the consistency of rusty water or thin syrup, was pumped out of the wells by air pumps and the sulphur was seen to have been discharged in spurts and that the sulphur was not pumped or transported except when in this liquid state.

And I wish that you would assume that the prior use by Willson, Cotton, Warner & Ring, at Miami, Florida, involved a use in which muck and clay-like marl was dredged from the bottom of a waterway by scooping the material, including a large amount of water, into a hopper; that the water with the entrained muck and marl was then sucked into a big cylinder by vacuum produced by condensing steam within the cylinder; that this material was then discharged from the cylinder through a long pipe eighteen inches in diameter, by supplying steam under pressure to the top of the cylinder and the manual valves being operated to control the intake by a discharge from the cylinder, and that water and much occasionally included a stone or a piece of coral carried along in suspension by the water and mud.

(Testimony of Frederick Ray.)

I will, if you wish, if I have not done so, make copies of these assumed hpyotheses available.

Now, with that in hand and with the patents and [515] the publications of the prior art in mind, I wish you would state whether it is possible in your opinion in some manner or degree to classify those disclosures and uses of what is said to be the prior art, and if so to state what the line or lines of that classification are?

Mr. TOWNSEND.—If your Honor please, accepting that the intricate hypothetical question of counsel is an admission practically, that his patent is invalid, I object to it because it is not necessary at this time to burden the Court with the opinion of ancillary councillors under the guise of expert witnesses. We have specifically refrained from offering any attempted explanation of patents as simple as these and which your Honor may understand and will understand by a simple reading of them, and it will be for the attorneys to make the classifications, if any are to be made. I think it would be a great waste of the Court's time to listen here to a dissertation by what Judge Cox has termed "an ancillary councillor under the guise of an expert."

Mr. WILLIAMS.—I have encountered, and I am sure that there are more than a hundred of these publications. There are hundreds of pages of depositions. The question, while it is long in form, asked the witness to asume that the depositions show certain things. Then the question is a simple one, as to whether there is some way of classifying

(Testimony of Frederick Ray.)

these things and if so, what the line of classification is. That classification, if it has been made carefully by someone who undersands the subject matter, it seems to me is a thing that we are [516] entitled to have shown to the Court as a basis for an argument based upon these things, taken somewhat in groups rather than singly. I surely think that the question is material.

The COURT.—You can argue that yourself and make your own classification. The objection will be sustained.

Mr. WILLIAMS.—Exception, please.

The COURT.—Proceed, if you have anything further with this witness. All of the publications have been submitted for what they are worth and they will be argued for what they are worth. Proceed if there is anything further.

Q. Will you explain to the Court, Mr. Ray, the mode of operation of the device and apparatus disclosed in the patents and publications which have been offered in evidence by the defendants here in alleged exemplification of the prior art.

Mr. TOWNSEND.—I object on the same ground. It is the same question.

The COURT.—Sustained. They will show by its very simplicity.

Mr. WILLIAMS.—Note an exception.

The COURT.—Noted. Proceed.

Mr. WILLIAMS.—On behalf of the plaintiff, if the Court please, I offer to prove by this witness that all of the patents, publications and prior uses

offered in evidence by the defendant, and shown or intended to be shown by the depositions fall into two classes; first a class in which merely the flow of liquid is involved or the flow of materials, which follow the laws of [517] liquids in equal distribution of their hydrostatic pressures and in every respect conforming to the flow of liquids. And a second group in which dry pulverant material, such as cement or sand, or gold-dust are carried along in suspension by more or less rapidly moving streams of air or steam or other gas and that in the class involving the flow of liquids and the principles relating to the flow of liquids, there are in some instances examples of entrained material—mud, sand, gravel, sometimes occasionally rock in the mud, dredged from the bottom of a waterway, or a piece of coral dredged from the bottom of a waterway, which is carried along in suspension by the liquid-like material, and that these materials thus carried in suspension where they are finely pulverant material carried along in an air stream or sand or other material carried in a stream of liquid or fluid are in those cases carried wholly by the kinetic energy or by the velocity of the moving stream. That they are not carried by pressure. I offer to make that proof by this witness.

Mr. TOWNSEND.—The same thing applies, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Testimony of Frederick Ray.)

The COURT.—Anything further with this witness?

Mr. WILLIAMS.—I wish, Mr. Ray, that you would look at a copy, say, of Kolsche German patent No. 18,394. You have a copy of that available, have you?

A. Yes, sir.

Q. Will you state what scientific principle or principles are involved in the conveyance of the coal dust, sand or [518] other granules there described as being carried or transported by the means there disclosed.

Mr. TOWNSEND.—I will make the same objection. They are now attempting to get at these things piecemeal.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception. And I offer to prove that in the case of this Kolsche German patent, that the materials there described are carried, if at all, wholly by the kinetic energy or velocity of a moving air stream.

The COURT.—Proceed, if you have anything further.

Mr. WILLIAMS.—I take it that your Honor's ruling is that I can—

The COURT.—I have sustained the objection.

Q. Now, will you look, Mr. Ray at the Sickles patent, No. 99,360—

Mr. TOWNSEND.—The same objection, your Honor. He is just getting at the same thing piecemeal.

(Testimony of Frederick Ray.)

Mr. WILLIAMS.—So far, I have only asked the witness to look at the patent.

The COURT.—Wait until the question is put.

Q. Will you state whether or not the conveyance or removal of sand from the bottom of the caisson there shown is in accordance with the mode of operation like that disclosed in the structure of the McMichael patent in suit, or upon some other and different principle.

Mr. TOWNSEND.—Your Honor, the same objection.

The COURT.—Yes. They show for themselves. Objection sustained.

Mr. WILLIAMS.—Exception. I offer to prove that [519] the principle there involved is that of the kinetic energy of an air stream acting wholly by its velocity and not by pressure.

Q. Will you look, Mr. Ray, please, at the Warren patent No. 671,302, sand blast apparatus and state whether or not the sand there described as being shot through the blast conduit is moved by the kinetic energy of the molecules by air impinging upon the several particles of sand or by some pressure, the operation comparable with that involved in the operation of the McMichael apparatus.

Mr. TOWNSEND. — Same objection, for the same reason.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Testimony of Frederick Ray.)

Q. Mr. Ray, will you look at the following group of patents namely, Smith patent No. 122,498 and particularly at the package which refers to the amount of liquid concrete which has a consistency such that it will settle to a perfecly level surface; the Golvie patent, No. 676,128, wherein the shooting of grout is described; the Golvie patent No. 676,129, wherein the flow of grout is involved; the Moir patent, 778,878, wherein the movement of fluid lime grout is described; the Thomas patent, No. 873,345, involving a grouting machine and the McIllvrid patent, No. 958,421, disclosing a machine for the flow of grout, and state, if you will, whether there is in those machines, or in their operation or their construction, anything comparable with the mode of construction or the mode of operation of the [520] McMichael patent in suit.

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. I wish, Mr. Ray, you would look at the patent showing lift pump for the flowing by liquids, exemplified in the following publications of patents offered by the defendant, namely, Pohle patents No. 487,639, disclosing the pumping of water; Saunders patent No. 597,023, disclosing the pumping of water; Frasch patent No. 799,642 disclosing the pumping of liquified or molten sulphur; Frasch patent No. 800,127, disclosing the pumping of liquid and molten sulphur; Rix and Donahoo patent No. 635,270 disclosing the pumping of dredged water

(Testimony of Frederick Ray.)

and entrained water or "spoil"; the Frizell patent, No. 233,499, disclosing the pumping of water; the Harris patent No. 759,100 disclosing the pumping from deep wells of fluids such as water or oil, and the Harris patent No. 814,601 disclosing the pumping of water, and I will ask you to state whether any of those patents disclose the transportation of material having the arch forming possibilities or characteristics of concrete forming material, or whether they disclose any other principle of mode of operation such as that involved in the structure and mode of operation of the McMichael patent in suit?

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Mr. Ray, I will ask you to look at the following patents [521] offered in evidence by the defendants and describing the movement of entrained and suspended solids in water or other liquids, particularly Duckham British patent No. 4,400 of 1875 disclosing the liquid flow of mud or entrained spoil with water from dredges; Duckham British patent No. 15,348 of 1885 disclosing the transportation or flow of water with entrained mud or spoil from dredges; the Hussey & Harson patent No. 497,427, disclosing the flow of mud from dredges, including gravel and sand and debris in the water or entrained in the water; Hussey patent No. 526,530, disclosing the pumping of water and muck from

(Testimony of Frederick Ray.)

dredges, including ground, gravel and other debris entrained and carried in suspension in the water; the Rix & Donahoo patent No. 635,270 disclosing the pumping of water and spoil from dredges with the entrained material and the patent of Church No. 487,606, disclosing the pumping and the atomizing and the spraying of alabastrine steel paint or a mixture of alabastrine paint and water, forming a paint-like consistency, for painting or coating the sides of buildings by means of a spray nozzle and I ask you to state whether in connection with those patents—or whether any of them disclose the mode of operation and particularly the formation of slugs in the discharge duct in a manner comparable with that involved in the operation of the apparatus disclosed in the McMichael patent in suit.

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Mr. Ray, I ask you to look at Church patent 487,606 and [522] Rix & Donahoo patent No. 635,270 and ask you to note that they both describe so-called ejectors or injectors. I will ask you to state what the scientific principles are involved in the operation of such ejectors or injectors.

Mr. TOWNSEND.—We make the same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you, Mr. Ray, whether these pat-

(Testimony of Frederick Ray.)

ents do disclose ejectors or injectors or devices acting and operating upon the principles of ejectors or injectors.

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you, Mr. Ray, whether any of the prior uses assuming them to have been of the character described in the hypothetical question which I asked you somewhat earlier and which I won't repeat—whether in any of those prior uses there was involved a mode of operation and segmental discharge or a slug formation of the materials there handled comparable with that involved in the operation of the McMichael patent in suit or structures such as are described and claimed in the McMichael patent in suit?

Mr. TOWNSEND.—Same objection applies as to the prior uses.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Let me ask you, Mr. Ray, whether any of the devices [523] disclosed in any of these patents or publications offered by the defendant are conforming to the assumption which I have asked you to make relative to the claim of prior uses—whether any of those apparatuses could be used or adapted to be used successfully in the transportation or placement of concrete if they were supplied with concrete forming materials of the character con-

(Testimony of Frederick Ray.)

templated by the McMichael patent in lieu of the materials which they are described as having been intended to handle and without making any changes or modifications in the structure disclosed.

Mr. TOWNSEND.—I make the same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Do you find, Mr. Ray, in any of the patents or publications or assumed uses of the prior art as I have described them a device or means of placing materials of any character, including a vessel, or comprising a vessel for containing the materials in a body with pressure maintained behind the body of the materials, but forcing them into a restricted outlet and a pressure jet, acting to inject air into the materials in the general direction of the outlet?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Do you find in any of these things, Mr. Ray, a device involving means for causing a jet of air to impinge upon such successive portions of the masses in a vessel such as those disclosed or described in the McMichael [524] patent in the general direction of the discharge duct to control or assist in the formation of the sub-masses through them?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. Will you state, Mr. Ray, the mode of operation and the principles involved in the operation of

(Testimony of Frederick Ray.)

a so-called air lift pump of the character disclosed in several of the patents and publications and the testimony, as you may assume it, of the witnesses, by these depositions.

Mr. TOWNSEND. — Same objection, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

Q. I will ask you whether any principle or mode of operation involved in the operation of these air lift pumps for the handling of any or all of such liquids as are mentioned or described in the patents is comparable in any way with the mode of operation involved in the operation of the McMichael patent?

Mr. TOWNSEND.—Same objection.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception. [525]

The witness testifies that he went downstairs during the recess in the afternoon and looked at the machine offered by the defendant as Defendant's Exhibit 179, said to have exemplified the disclosure of the Canniff patents. The witness, having a copy of the Canniff patent before him and comparing the apparatus in the basement with the device shown and described in the Canniff patent, finds the particular difference is in the connection of the discharge pipe which is marked "D" in the Canniff patent, which is at the left of the structure beyond or on the other side from the chamber beyond the

(Testimony of Frederick Ray.)

air connection which leads into the bottom of the chamber for stirring purposes.

Q. Now, Mr. Ray, can you suggest a reason why the Canniff structure as shown in the patents would be a desirable one for promoting the flow of such a liquid or fluid material as grout?

A. Yes, it is a structure which simply produces pressure—

Mr. TOWNSEND.—(Interrupting.) If your Honor please, he is indulging now in a violation of the ruling of the Court, trying to construe the Canniff machine, which is the Court's prerogative.

The COURT.—I think so. It shows for itself. Objection sustained.

Mr. WILLIAMS.—Exception.

The witness says that the arrangement shown in the Defendant's Exhibit 179 in his opinion, would be capable of transporting concrete to a better advantage and by a different mode of operation than anything that could be derived from the operation of the Canniff mechanism just as it is shown in the Canniff patent. The change in the piping in the exhibit machine itself permits it to be operated as a McMichael machine whereas in the arrangement of pipe shown in the patent it is impossible to so operate it. [526]

Q. I think I will ask you whether there is any suggestion in the Canniff patent of such a change as is incorporated in the Defendant's Exhibit 179 apparatus, or whether in any of the other publications or disclosure patents or the prior art there is

(Testimony of Frederick Ray.)

any suggestion of such a change for bringing about a different mode of operation, or otherwise.

Mr. TOWNSEND.—The patent is the best evidence, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

The COURT.—Anything further? If anything further, proceed; if not, cross-examine.

Mr. WILLIAMS.—That is all with this witness.

The COURT.—Cross-examine.

Cross-examination.

(By Mr. TOWNSEND.)

[The witness believes that the apparatus and parts that he has had introduced during his direct testimony to-day was in town on the previous day though he did not know it at the time he gave his testimony on the previous day. He knew that he had made the test, however, but he was not asked to produce the apparatus when he was called upon to give his opinion of the existence of slugs in the apparatus. He thinks that his counsel knew that the apparatus was in existence. In the photographs he thinks apparatus indicated by Plaintiff's Exhibits 200 to 203 inclusive, the elbow structure that has a hole at the bend is located at the discharge end of the line. That is, one flange is connected to the discharge end of the straight pipe, which is in the foreground and not shown in the exhibit 203. The other opening of the elbow forms the actual discharge of the conduit. On this ex-

(Testimony of Frederick Ray.)

hibit 203 we see a machine of the vertical type in the distance and the discharge point or elbow which the witness [527] refers to and where this vibrator was placed, is towards the viewer of the picture right at the point where the concrete comes out of the pipe so that when the concrete is propelled through that long pipe it is brought to a sudden turn and then dropped. When concrete is blown against an instrument or against a wall, the weight of the concrete due to its velocity causes a pressure or force to be exerted upon the wall or upon anything that it is blown against. The witness has seen things used on the discharge which are very similar to the bend or elbow at the end of the discharge pipe. In some instances the concrete is allowed to pass on in a continuous line but not always. As an engineer, the witness knows that in bringing concrete or any heavy mobile substance to a sudden turn there may be a tendency to choke at that point but, as a matter of fact, choking does not occur as a rule because in most of these pipes there are 90° elbows. The witness thinks that in general 45° elbows are used but that it is not necessary. He thinks that it is better practice in general. There is less danger of blocking in a straight pipe or in one which gives the concrete as near an even continuous motion and movement in the pipe as possible. The witness can tell exactly from the records with what rapidity the apparatus that he has introduced can vibrate. He has not figured it out exactly but figures it at the rate of

(Testimony of Frederick Ray.)

100 or more a second. That machine which the witness made is capable of vibrating about 100 a second. He was in San Francisco on Wednesday, September 7, 1927.]

Redirect Examination.

(By Mr. WILLIAMS.)

He did not hear on or about September 7 that any tests or demonstrations were to be made by the defendant. He knew nothing of the matter whatever at that time. [528]

Mr. WILLIAMS.—I would like to ask counsel to let me see the last notice which he submitted to the Court this morning in that regard.

The COURT.—If any such thing is to be proven, it has to be proven properly.

Mr. TOWNSEND.—The notice, your Honor, is in the file. It was served on counsel Friday, prior to the test.

The COURT.—Very well. Anything further with the witness?

Mr. WILLIAMS.—No, your Honor.

The COURT.—Call your next witness.

(Witness excused.) [529]

TESTIMONY OF HARRY B. KIRKLAND, FOR PLAINTIFF (RECALLED IN REBUTTAL).

HARRY B. KIRKLAND, plaintiff's witness in rebuttal.

I am the Harry B. Kirkland who previously has been sworn and who testified in this case.

(Testimony of Harry B. Kirkland.)

Q. Did you hear the testimony of Mr. Ray relative to the apparatus which was arranged and operated to make graphic records and disclosure of the slug formation and action in the discharge conduit of a McMichael pneumatic placer?

A. Yes, sir.

Q. You heard that? A. Yes, sir.

Q. Did you witness and participate in the demonstrations and tests which he described?

A. Yes, sir.

Q. Did you see made these charts and records?

A. Yes, sir.

Q. Graphs which have been produced here?

A. Yes, sir.

Q. Will you say whether they were made under the conditions as described by Mr. Ray and in your presence? A. Yes, sir, they were.

Q. Can you vouch for the authenticity of the charts and the ribbon graphs as here produced and say that they are the things accepted by Mr. Ray?

A. Yes, sir.

Cross-examination.

These tests were made in a shop building in Chicago, Illinois.

TESTIMONY OF ROY WILKINS, FOR DEFENDANT (RECALLED IN REBUTTAL).

ROY WILKINS, defendant's witness, recalled in rebuttal.

I heard the testimony of Mr. Ray in regard to the tests that he made on this apparatus called a

(Testimony of Roy Wilkins.)

vibrator. I know what that [530] instrument is. I have used such an instrument for other purposes. It is usually used in cases—in such cases where it is required to get a history of the impact. I do not believe that it could be made to determine the flow of concrete through a pipe. My reason for this answer is because it measures impact or the action of a particle against the diaphragm, which is a product of the speed with which the particle is moving and its weight; not a quantity of flow. It is something like recording the impact of a projectile. I do not believe that the vibrator of the plaintiff would record anything if operated in a straight piece of pipe where the concrete was flowing by it or adjacent to it or out of contact [531] with it, except such accidental particles that hit it, that pass by. The instrument which I use in my tests is known as an oscillograph. It is guaranteed by the manufacturers for 5,000 cycles per second which is about ten thousand impulses. I have used it for impulses above two thousand.

Cross-examination.

(By Mr. WILLIAMS.)

Q. I want you to look, Mr. Wilkins, at one of the oscillographs,—not the oscillograph, but impact ribbon records offered by Mr. Ray in connection with, or offered by plaintiff in connection with Mr. Ray's testimony and state—I want you to look at this record and state how many vibrations can be counted per second of time as marked and indicated

(Testimony of Roy Wilkins.)

upon this ribbon. Take the place where they are most frequent?

A. These, I understand are second marks on the bottom?

Q. No, they are half-second marks.

A. With markings of half second on the bottom I think that an accuracy of 40 or 50 could be relied upon and possibly somewhat higher than that with some error.

Q. How many are actually shown there within the period of a second, or what is the highest rate shown on this particular ribbon?

A. Approximately twenty.

Q. How long? A. In a quarter of a second.

Q. That would be eighty in a second.

A. That would be eighty in a second.

Q. You counted only the major ticks, did you not, within that strip?

A. I counted the major ticks where they were the most numerous. [532]

Q. And you omitted the minor variations.

(Witness does not answer.)

Q. How? A. I did, yes, sir.

The COURT.—We will suspend now until tomorrow morning.

(Witness excused.)

Whereupon an adjournment was taken at 4:40 P. M., September 14, 1927, to ten A. M., September 15th, 1927.

(Testimony of Arthur P. Robinson.)

September fifteenth, 1927, ten o'clock A. M.

Court convened, pursuant to adjournment. All parties present.

Counsel for plaintiff offered in evidence, as Plaintiff's Exhibit 209, copies of the patents which were cited during the prosecution of the application for the McMichael patent in suit, the file-wrapper of the McMichael patent as offered in evidence by the defendant not having included such copies of the reference patents. The said reference patents were admitted in evidence.

TESTIMONY OF ARTHUR P. ROBINSON, FOR PLAINTIFF (RECALLED IN REBUTTAL).

ARTHUR P. ROBINSON, plaintiff's witness, recalled in rebuttal.

I am the Mr. Robinson who has previously been called and sworn in this case. I am familiar with concrete construction work and the machinery for it. In mixed concrete 90 to 95 per cent is solids and the balance water. When there is 90 per cent solids and 10 per cent water you have what I would consider a sloppy mixture. It is the medium of sloppiness or wetness and is permissible or feasible for satisfactory concrete construction. A concrete containing 95 per cent solids would be what we consider a very dry concrete—practically no slop.

The Canniff grout machine manufactured by the Ransome Company for many years is still being

(Testimony of Arthur P. Robinson.)

manufactured and sold by [533] the Ransome Company.

Cross-examination.

In regard to the Canniff grouting machine—in regard to the Canniff Ransome concrete machine, are you still making that? A. Yes, sir. [534]

Q. Is that the machine that is an article appearing in the compressed air magazine entitled "Pneumatic Concrete Mixing Machine in New York Subway"?

Mr. WILLIAMS.—If the Court please, that is not germane.

Q. At page 8464, and which has been offered in connection with the New York depositions—exhibit 95. Is that the machine described in that article?

Mr. WILLIAMS.—I object on the ground that the question is not cross-examination. He is asking about an entirely different machine.

The COURT.—Well, the witness will probably answer. He has a right to identify the machine, I think. Overruled.

A. That looks like our machine—some cuts that we used, yes, sir.

Mr. TOWNSEND.—I offer this, your Honor, in explanation of the testimony, as our next exhibit.

(Whereupon said copy of magazine article appearing in the "Compressed Air" magazine at page 8464 was admitted in evidence as Defendant's Exhibit 210.)

The COURT.—This is what now? What is this exhibit supposed to be?

(Testimony of Arthur P. Robinson.)

Mr. TOWNSEND.—This is an article descriptive of the Ransome Canniff pneumatic mixer and placer for concrete—an adaption of the Canniff machine.

The COURT.—I suppose it shows for itself. Anything alse?

Mr. TOWNSEND.—Just one more question.

Q. You speak of the consistency of concrete, Are you acquainted with the publications of the Portland Cement Association? A. Yes, sir.

[535]

Q. I will read this to you and ask if this is a correct statement of transporting concrete. In the article it says, "As in the case of measuring equipment selection of means of transporting from the mixer to place of deposit is ordinarily a question of economy, the only qualification being that the means selected must not interfere with the delivery at the place of deposit of concrete of the proper quality. The design of the mix may be governed largely by the type of equipment to be used in transporting concrete. If chuting equipment is to be used, the slope and length of the chute may be adjusted to permit the movement of the desired mix, or the mix may be adjusted to fit the slope of the chute. The extra cement required to maintain quality with the increased flowability may easily be justified by the saving in transportation cost.

"Care in placing. With a well designed mixture, delivered with proper consistency and without segregation, the placing of concrete is greatly simpli-

(Testimony of Arthur P. Robinson.)

fied but even in those cases, care must be exercised to further prevent segregation and see that the material flows readily into the corners and angles of the forms and around the reinforcement." Is that a good statement of conditions according to your understanding? A. Yes, sir.

Mr. TOWNSEND.—That is all.

Redirect Examination.

(By Mr. WILLIAMS.)

Q. Now, Mr. Robinson, this article that was submitted and which now has been offered as Defendant's Exhibit 210 and which counsel says refers to a so-called Ransome Canniff machine, you have not read that article, I presume? [536]

A. No, sir.

Q. Let me ask you, however, what was the experience of your company, the Ransome Company in connection with its effort to make a concrete mixing and conveying device and which resulted in the thing which is here, as I presume, called the Ransome Canniff machine?

Mr. TOWNSEND.—I object to that as not proper redirect, and, further, it is immaterial what their efforts were. They have testified that they made this machine.

Mr. WILLIAMS.—Now, if the Court please, counsel availed himself of the opportunity, since this witness was on the stand to ask him about this matter which I conceive not to be germane to the direct, and he takes up here a machine which has

(Testimony of Arthur P. Robinson.)

not been referred to. It has been designated here as the Ransome Canniff machine. There is a long article here about it. I expect I know just what the substance of that article may be, although I have not seen the article. He asks the question and he gives me the right to cross-examine, if I so desire. Certainly to follow up the inquiry as to what the significance may be, and that is the reason that I conceived that counsel produces it here—the Ransome Canniff machine.

A. What was the question?

(Question read.)

"Q. Let me ask you, however, what was the experience of your Company, the Ransome Company in connection with its effort to make a concrete mixing and conveying device and which resulted in the thing which is here, as I presume, called the Ransome Canniff machine?" [537]

The COURT.—I cannot see where that would be proper.

Mr. WILLIAMS.—I should like to show by this witness, since this matter has been brought in, that the Ransome Company, owning the right to a new Canniff machine, endeavored for years to utilize that machine for handling concrete and failed. Nevertheless, having adopted the McMichael scheme of operation and structure, they put out a machine, the Ransome Canniff, the name being the name of the Canniff patent. I want to show that they were unable to make that Canniff machine operate and—

The COURT.—(Interrupting.) I think you have covered that. It is not rebuttal. The matter of the Canniff machine was gone into by both parties.

Mr. WILLIAMS.—I know, but for the first time now, counsel brings a publication which designates a machine of the Ransome Company as the Ransome Canniff machine.

The COURT.—If it is not identical or the same thing, the Court will not take notice of it.

Mr. WILLIAMS.—That is all. I will note an exception.

(Witness excused.)

The COURT.—Any further testimony by either party?

Mr. WILLIAMS.—We have none.

Mr. TOWNSEND.—We have none. [538]

Testimony closed.

Mr. TOWNSEND.—In connection with the test that was made in San Francisco on September 7th, with the Smith and the Canniff machines, I would like to have it appear of record that in addition to the invitation extended to the plaintiff and served here in Seattle, I served on Friday the week previous, upon counsel for the plaintiff in San Francisco an identical notice, and if necessary I would like to offer this now and have it filed in connection with the case as exhibit 211.

The COURT.—What is that?

Mr. TOWNSEND.—A notice running to the Concrete Mixing and Conveying Company—

The COURT.—What notice?

Mr. TOWNSEND.—A notice to the plaintiffs and their attorneys.

The COURT.—Now is it acknowledged?

Mr. TOWNSEND.—It is acknowledged by Mr. Van Vliepp (Van Fleet).

Mr. WILLIAMS.—That is in another case. I submit that it is not material or relevant here.

The COURT.—It will be received for what it is worth.

(Notice of time and place of test was admitted in evidence as Defendant's Exhibit 211.)

Mr. WILLIAMS.—If the Court please, I should like to say as a matter of record in that connection that it appears now that some such notice as counsel refers to was served also in this city by handing a copy, as I presume, if I rightly understand, to some clerk in Mr. Helsell's office here in Seattle. For some reason it did not come to Mr. Helsell's attention, nor to the attention of any member of his firm so that they communicated [539] the information in any way to those in Chicago who have been interested in this matter, nor to Mr. Ray—to no one excepting the clerk, and no one except the clerk knew that that notice had been served until it was referred to yesterday for the first time. We are not charging the defendant's counsel for any responsibility for not making better service, but I do wish to show the fact that none of us knew of it.

Mr. CHADWICK.—A duplicate copy was served on Mr. Helsell's office as an accommodation to associate counsel.

Mr. WILLIAMS.—I grant that was the fact.

(Deposition of Thomas S. Leake.)

Mr. HELSELL.—It was served but not delivered to me by the clerk in my office.

The COURT.—The parties will have ten days on each side to file a brief. Go ahead with your argument. [540]

DEPOSITION OF THOMAS S. LEAKE, FOR DEFENDANTS.

Deposition of THOMAS S. LEAKE, taken at Chicago, Illinois, on Monday, September 12, 1927.

B. F. WUPPER, Esquire, on Behalf of Plaintiff.

RALPH M. SNYDER, Esquire, on Behalf of Defendants.

THOMAS S. LEAKE, called as a witness on behalf of the defendants, having been first duly sworn, testified as follows:

Direct Examination.

(By Mr. SYNDER.)

Q. Will you state your full name, please?

A. Thomas S. Leake.

Q. And your age? A. Sixty-seven.

Q. Where do you live, Mr. Leake?

A. In Chicago.

Q. What is the residence address?

A. 6556 Woodlawn Avenue.

Q. And your office is on Michigan Avenue?

A. No. On Dearborn Street.

Q. On Dearborn Street? A. 608.

Q. 608 Dearborn Street? A. Yes, sir.

(Deposition of Thomas S. Leake.)

Q. What is the nature of your business?

A. Well, it is handling water and coal for railroads.

Q. In the handling of water and coal for railroads does that include equipment and maintenance.

A. A little of everything; buildings and everything in connection with coaling stations and water stations. [541]

Q. For how long has that been your general occupation?

A. Oh, I should say about ten years; but before that I was a general contractor.

Q. And as general contractor did you have contact with buildings for railroads and the like?

A. Oh, yes, for twenty years.

Q. That would go back to 1895 or so?

Mr. WUPPER.—Objected to as leading.

A. Somewhere along in there.

Q. And during that period of time you have been contracting generally, have you?

A. Yes; for railroads.

Q. For railroads?

A. Buildings, roundhouses and Y. M. C. A.'s and depots.

Q. In what parts of the country generally has that taken you?

A. That takes from New Orleans to the Dakotas.

Q. You were subpoenaed to testify in this case, were you not, on behalf of the defendant?

A. I suppose so.

Q. The marshal served you with a subpoena?

(Deposition of Thomas S. Leake.)

A. I don't know. I just seen the subpoena and he told me to be here on the 12th. I didn't even read the names on there.

Q. Do you remember testifying on a previous occasion. Mr. Leake, concerning the Leake patent for Improvement in Concrete Mixing and Distributing System, being Patent No. 1,213,558 of February 13, 1927? A. 1917?

Q. Yes, I will show you in just a second. [542]

A. I don't remember anything about it.

Q. Just a minute. I will show you this. You might glance over, Mr. Leake, the part of the testimony taken June 11th of this year and referring to the Leake patent page 5 and from there on.

Mr. WUPPER.—The question is objected to as leading. It is the exclusive prerogative of the cross-examiner to confront the witness with prior testimony. Confronting the witness with his prior testimony vitiates its probative force.

(Witness reads testimony submitted to him.)

Q. (Continued.) I want to know if you remember testifying about the Leake patent for a concrete mixing and distributing system.

A. I never had a patent on it.

Q. What was the patent that you had?

A. I didn't have any. It was objected to by—What do you call it? Stopped me from getting a patent, and I sold out my interest, what I owned there.

Q. Do you recall my showing you the issue of letters patent and a file-wrapper and contents, which

(Deposition of Thomas S. Leake.)

we offered in evidence, on a concrete mixing and conveying system, as Defendants' Chicago Deposition Exhibit 126?

A. Well, the patent was never issued to me that I know of. I sold it to a man, I think you got his name in there, by the name of Bliss; some kind of a stopper put on me getting it, so I didn't pay any more attention to it.

Q. You sold him all your interest in it? [543]

A. No patent ever issued to me that I know of.

Q. Do you remember what the figures were that he paid you for it?

Mr. WUPPER.—I object to that as irrelevant.

A. I don't know now. I think though it was about six thousand dollars, but I wouldn't say for sure.

Q. And was that paid, whatever the amount was?

Mr. WUPPER.—Objected to as irrelevant and immaterial.

A. Yes; from time to time.

Q. All of it has been paid now?

A. Yes; it was all paid out.

Q. Do you remember one of the interference proceedings was with a man named Darley?

A. There was something about it, but I don't know what it was.

Q. William W. Darley?

A. Yes, something about it, I don't know.

Q. That was some time in 1909 or so?

Mr. WUPPER.—I object to that as leading.

A. I couldn't say.

(Deposition of Thomas S. Leake.)

Q. I call your attention to photostatic copy of a preliminary statement which you made in the interference proceedings, made by you in May, 1909, and ask you if you recognize there the reproduction of your signature.

A. Yes; that is mine. I suppose I never read it, because it was made by my attorneys.

Q. I will ask you to read the preliminary statement appearing above your signature, if you will, read it into the record, please.

Mr. WUPPER.—Objected to as incompetent, immaterial and [544] irrelevant and not the best evidence of any statements made therein.

Q. Will you read it out loud into the record, Mr. Leake?

A. Well, I don't ever recall of reading this over. It was made out by an attorney for my signature. Do you want it read now?

Q. Yes, please?

A. (Reading:)

"In the United States Patent Office. Thomas S. Leake vs. William W. Darley. Interference No. 30,335. State of Illinois, County of Cook. Statement of Leake. Filed May 28, 1909. Approved June 25, 1909."

Signed by a Letter "L." I don't know what that is.

"PRELIMINARY STATEMENT.

"Thomas S. Leake of Chicago, in the County of Cook and State of Illinois, being duly sworn doth

(Deposition of Thomas S. Leake.)

depose and say that he is a party to the interference declared by the Commissioner of Patents May 18, 1909, between his application for Letters Patent filed October 7, 1907, Serial No. 396,270, and the application of William W. Darley of Pittsburg, Pennsylvania, for apparatus for Handling Ashes and Other Materials; that He conceived the invention set forth in the declaration of interference on or about the first day of February, 1905, that he first made drawings of the invention on or about the first day of March, 1905; that he first explained the invention to others on or about the first day of June, 1905; that he first embodied his invention in a full sized machine which was completed on or about the first day of September, 1905; and that on or about the first day of September 1905 the said machine was first successfully operated in the City of New Orleans and State of Louisiana, and that he has since made and used other machines embodying the same invention.

"THOMAS S. LEAKE.

"Subscribed and sworn to before me this 26th day of May, A. D. 1909.

ANNIE C. COURTENAY,

"Notary Public of Cook County."

Mr. WUPPER.—Objected to as entirely incompetent, irrelevant [545] and immaterial and not the best evidence of the statements therein, and of a date subsequent to the filing date of the application which resulted in the patent suit.

(Deposition of Thomas S. Leake.)

Q. Mr. Leake, did you testify that this is your signature at the conclusion of that statement?

A. That is my signature on there.

Q. Those statements were true at the time they were made?

A. I did not read it over, I told you before, I never read it.

Q. You have no reason to believe they were not true, have you? A. No.

Q. If they were prepared by your attorney, he was one who was acting in your behalf and had your confidence? A. Yes.

Q. When you signed it you signed it with the thought and intention that it would be used in the interference proceedings in your behalf and on behalf of your application for patent then pending in the Patent Office?

Mr. WUPPER.—Objected to as leading and immaterial.

A. Yes.

Mr. SNYDER.—At this time defendant produces, introduces and offers in evidence certified copy of Interference Proceedings No. 30,335 entitled Darley v Leake, as Defendants' Chicago Deposition Exhibit 130.

Mr. WUPPER.—Objected to as irrelevant, incompetent and immaterial.

Q. This statement in the interference proceedings referred [546] to your pending application for concrete mixing and distributing system, did it?

A. I don't know.

(Deposition of Thomas S. Leake.)

Q. Did you have any other patent application pending that time?

A. There was one. I forget now what it was, but I know I got that patent.

Q. That wasn't any patent Darley was mixed up in, any interference? A. Not as far as I know.

Q. This was the one you referred to as concrete mixing and distributing patent application?

A. Yes, as far as I know.

Q. Do you have any of the drawings that you say here were made on or about the first day of March, 1905? A. There is one general sheet is all.

Q. You say you have one?

A. I don't know whether I got it now. There was one regular sheet?

Q. Of the drawings? A. Yes.

Q. Where would that be? Where would you look for it? A. I looked for it in my office, I suppose.

Q. Do you remember looking for it in connection with the testimony taken in June? A. Yes.

Q. And did you find it then? A. Yes.

Q. I will ask you if this is a copy of the drawing you had in mind.

A. That is taken off of that blue-print; that is taken [547] from a blue-print?

Q. Do you remember letting us have your drawings with a promise to return it, with a stipulation that photostatic copies might be made? A. Yes.

Q. And used in court?

A. Yes. This is the copy of the blue-print.

(Deposition of Thomas S. Leake.)

Q. This is the copy of the blue-print you referred to as a drawing showing that devise.

A. Yes. Well, yes, I suppose it is the same in the patent application papers, you would find that, I think that will show that in the general picture before it goes into details.

Q. I see. Have you any other drawings showing the device? A. Not that I know of.

Q. Referred to here as made in 1905.

A. I was not interested in it any further.

Q. Is the structure which you built in 1905 in New Orleans still in existence? A. I guess it is.

Q. Where would I find that structure.

A. That structure is Stuyvesant Docks in New Orleans.

Q. Is that the building you built or the machines you used?

A. No; that was nothing but a crude machine put up there to see whether I could put concrete up in the air.

Q. What happened after you used that?

A. I tore it down.

Q. Did you keep that?

A. No. It was nothing only a lot of two by four stuff put up with hoops. [548]

Q. So that is not in existence now?

A. Oh, no.

Q. Do you know of any other pictures or blue-prints of that device other than the one you have referred to here? A. No.

Q. What was your position, Mr. Leake, in 1905?

(Deposition of Thomas S. Leake.)

A. Master carpenter.

Q. For what company?

A. Illinois Central Railroad.

Q. And where were you stationed at that time?

A. At Chicago.

Q. You were stationed at Chicago; and did you have occasion to be in New Orleans at that time?

A. I had, a good many times.

Q. In 1905?

A. Oh, I expect so, yes.

Q. Were you engaged in the construction of the Stuyvesant Dock there? A. Yes.

Q. Were you interested there in conveying concrete or similar materials to the roofs of buildings?

A. No; I was not a contractor.

Q. What were your duties there?

A. I was to look over everything between—Everything the Illinois Central owned.

Q. What connection did you have, if any, in connection with the construction of the buildings?

A. Looked after them, to see whether the contractors were building them right, as a representative of the [549] Illinois Central.

Q. Was there very much concrete work used in connection with the building of the Stuyvesant Docks?

Mr. WUPPER.—Objected to as immaterial.

A. Yes.

Q. That was the time that you were engaged in general supervision over the construction of those buildings; is that right?

(Deposition of Thomas S. Leake.)

A. That was years ago before that.

Q. I say at that time you were interested in seeing that those particular buildings were constructed properly; is that right? A. Yes.

Q. Representing the railroad? A. Yes.

Q. That is right, is it? A. Yes.

Q. Do you remember how they were pumping water at that time, using what devices? Were they using air compressors of the like?

A. Yes, air compressors.

Q. That was common practice?

A. No, not common practice.

Q. They were using it down there?

A. Yes.

Q. And had been for some time?

A. Not contractors.

Q. What is that?

A. Not the contractors. Our own men.

Q. Your own men had been using it? [550]

A. Our own; that is, the Illinois Central.

Q. You were then connected with the Illinois Central? A. Yes.

Q. For how long a period had you been using that,—your own men?

A. Right there, I couldn't say.

Q. There or any place.

A. Oh, for years.

Q. To that extent then it was general practice, with your own men using it?

A. Yes; put over deep wells and blew the water out of them with air; but it is costly to do that.

(Deposition of Thomas S. Leake.)

Q. You had that in mind as early as February, 1905, when you stated in this preliminary statement that first conceived the idea of your concrete mixing and distributing system, did you?

Mr. WUPPER.—Objected to as leading.

A. I couldn't say.

Q. You knew of it at least at that time?

A. I knew you could handle water.

Q. Yes. And when you conceived the idea of applying this to moving and distributing concrete, did you mean the application of air pressure?

A. Why do you put the word "distributing" in?

Q. That is used in the patent, as you put it in your application.

Mr. WUPPER.—That is objected to as leading.

Mr. SNYDER.—Now, will you answer the question?

The WITNESS.—Read it over again.

Mr. SNYDER.—Didn't you understand it. [551]

The WITNESS.—No; I did not.

Mr. SNYDER—Read it to him.

(Question was read to the witness.)

A. Do you mean air pressure?

Q. Yes. You say in your preliminary statement that you conceived the invention set forth in the declaration of interference on or about the first day of February, 1905. A. Yes.

Q. And I am asking you whether at that time, when you conceived the idea of moving of concrete as set forth in this application of yours for a pat-

(Deposition of Thomas S. Leake.)

ent, you were familiar with your process of moving water as you had been doing with the Illinois Central at that time. A. Yes, oh, yes.

Mr. SNYDER.—Defendant produces, introduced and offers in evidence the photostatic copy of the drawing of the Leake Automatic Concrete Mixer as Defendants' Chicago Deposition Exhibit 128.

(The exhibit was so marked.)

Mr. WUPPER.—The exhibit is objected to as incompetent, irrelevant and immaterial, and not clearly showing the mechanism it purports to illustrate.

Q. When you reduced to practice the idea that you had as stated in your preliminary statement, did you use any of the compressors that you have been using for water?

A. What do you mean, at New Orleans or here in Chicago?

Q. No; at New Orleans. [552]

A. Yes; I used them that I had been using on water.

Q. You used one of the air compressors that you had been using.

A. Yes; in working on that wall.

Q. I hand you Chicago Deposition Exhibit 127 in the case of Concrete Mixing and Conveying Company vs. Great Western Power Company, being a drawing, and ask you if you recognize having made this drawing. A. Yes, sir.

Q. What is that drawing of, Mr. Leake?

(Deposition of Thomas S. Leake.)

A. It is where I tried out air on concrete.

Q. Will you state what the part marked A represents?

A. That is the container where you put concrete in the top, we just had a hole in it and you pour it, just shot it up there and have the mass on top of that power-house.

Q. What is B?

A. The air pipe going over and coming down here.

Q. Compressor A?

A. No; this is not a compressor. It is the cylinder they put their concrete in. This looks like a compressor.

Q. What is the compressor?

A. This is the ground line.

Q. Referring to E?

A. D is the roof of the power-house and C is the pipe that carries it from the roof of the roundhouse, an exit from the cylinder that holds the concrete.

Q. When you applied the air pressure to A, what happened? [553]

A. It just all went up and landed up here.

Q. That is the concrete in the container A?

A. Yes.

Q. How quick was that? A. Instantly.

Q. And did the mixture come out in substantially the same shape on top of the roof that it was in the container?

(Deposition of Thomas S. Leake.)

A. Well, it came out in—just went all around there in a pile, you know; it was only just a test of three or four times.

Q. Exploded out?

A. Yes; blew right out there and come out.

Q. Did that satisfy you that the idea was a good one and could be used? A. Yes.

Q. At that time had the concrete work been completed on that structure?

A. I couldn't say for sure. I couldn't say that for sure, whether it had or not.

Q. How long did you remain there on that job in New Orleans after constructing this structure?

A. Might have left the night for Chicago or some other place.

Q. Yes. And was it at that time that you left the employment of the Illinois Central?

A. Oh, no; it was after that.

Q. It was after that? A. Yes.

Q. How long afterwards? [554]

A. I wouldn't say.

Q. Sometime that year, was it?

A. No; I suppose a couple or three years afterwards.

Q. When was it you were working for the Missouri-Pacific Railroad?

A. I think it was '07.

Q. And prior to that had you been in the general contracting work for yourself?

A. No, sir; I was with the Illinois Central.

(Deposition of Thomas S. Leake.)

Q. You left the Illinois Central to go with the Missouri-Pacific? A. Yes.

Q. When you testified previously I understood you to say that in 1907 you were not connected with the Illinois Central, but with the Missouri-Pacific, and you left the Illinois Central about the end of 1905 and that you went then with the Missouri-Pacific Railroad. Is that your present recollection?

Mr. WUPPER.—The question is objected to—

A. Yes. I am not sure on those details.

Mr. WUPPER.—Just a minute until I finish my objection. The question is objected to as leading and an improper method of examination, inasmuch as it does not call for the independent recollection of the witness.

Q. You have testified, I believe, that you did not save the apparatus that you used in New Orleans after you had constructed it? A. No, sir.

Q. Will you describe what the construction was, how you put the device together there? [555]

A. Why, this is made of wood.

Mr. SNYDER.—Witness referring to the container A.

A. It is constructed of wood, staved up; it is square and with hoops around it, bound together. Then this had an iron slide on the top, and bottom was hoppered a little bit, some little blocks thrown into the hopper. That is all there is.

Q. Would you say it was constructed as a temporary construction or a permanent one.

(Deposition of Thomas S. Leake.)

A. Oh, temporary; that is all.

Q. Just for temporary use? A. Yes.

Q. Do you remember a conference at your home, in San Francisco early this year with a gentleman who called in connection with asking you about these devices?

Mr. WUPPER.—Objected to as leading.

A. No one called.

Q. What is that? A. No one called.

Q. Were you living in San Francisco then?

A. No, sir.

Q. Were you staying at 1486 B Street, San Diego, California? A. Yes, sir.

Q. Do you remember there a gentleman talked to you along about March first?

Mr. WUPPER.—Objected to as leading.

A. Oh. Some time in the last winter.

Q. And he asked you about this construction down at New Orleans and you talked over the situation?

A. Well, he pushed this stuff up to me. I didn't know [556] what it was. He had a lot of records; I didn't know what they were.

Q. You understood he was trying to get what information you had?

A. I couldn't tell him, you know. I asked him what he wanted and he didn't seem to say what he wanted. I just let him go along and do his own talking. I suppose he thought that I said it.

Q. Did you tell him anything at all about what they had done down at New Orleans? A. No.

(Deposition of Thomas S. Leake.)

Q. Did you tell him that you had built that device down there?

A. I don't know whether I did or not.

Q. You would have no objection to telling him that if that came up in the conversation?

A. Oh, no.

Q. And perhaps make a drawing or watch him make a drawing, to get the best idea of what you were doing at that time?

Mr. WUPPER.—I object as leading.

A. I couldn't have done that. I didn't know what he was after, didn't know what he was doing or anything about it.

Q. You knew he was interested in this idea of raising concrete somewhat like they had raised the water?

A. No. Somebody at 'Frisco wired me he would come and then he sent down some other fellow. It was too far from 'Frisco to Los Angeles for that man that said he wanted to see me and he sent me some other fellow. [557]

Q. You talked the thing over one evening and then the next day he had some more papers and chatted with you a little.

Mr. WUPPER.—Objected to as leading.

A. He was going to catch an early train out of San Diego. He came in a taxi and asked me questions and away he went.

Q. You had a conference one evening and then the next morning he wanted to ask you some more questions?

(Deposition of Thomas S. Leake.)

A. Yes. I think he had asked about a thousand questions anyway.

Q. Do you remember talking over with him that the mixture you blew into this New Orleans structure was one part cement, two and half parts sand and five parts gravel of about one inch size? Does that sound familiar?

Mr. WUPPER.—I object to that as leading, irrelevant and immaterial and as being asked without proper foundation.

A. There may have been gravel in it and there may not. It is twenty years ago and I can't remember.

Q. That sounds familiar?

A. It sounds like the regular mixture we were using down there.

Q. You just run through here the regular mixture that you were using? A. I wouldn't say.

Q. What is your best recollection?

A. That we put it in there.

Q. You wanted to find out what would happen when you applied this air with respect to getting it up to the elevated point? [558] A. Yes.

Q. That was the purpose of your trying this out, was it not, to devise a practical means of getting the concrete up to the higher point?

Mr. WUPPER.—Objected to as leading and calling for the opinion and conclusions of the witness.

A. I wanted to see whether I could do it or not and whether air would put it up there.

(Deposition of Thomas S. Leake.)

Q. And what did you find out?

A. That you could put it up there.

Q. Do you remember building a similar structure here in Chicago a little later, Mr. Leake?

A. A similar what?

Q. Structure here in Chicago, for use here?

Mr. WUPPER.—Objected to as leading.

A. Structure; what do you mean?

Q. In connection with the Webster Building here.

A. I didn't build no structure. I built this machine over at the Webster.

Q. Yes. A. I don't call that a structure.

Mr. SNYDER.—Witness referring to the drawings Defendant's Chicago Exhibit No. 128.

Q. Do you recall when that was?

A. No; I do not.

Q. Was that after you had gone to the Missouri-Pacific Railroad?

A. Oh, it was after. I think it was after I came back here and went in the contracting business.

Q. Sometime in 1907, or so? [559]

Mr. WUPPER.—Objected to as leading.

A. I don't know.

Q. Tell us as much as you can remember of the use of the machine at the Webster Building here in Chicago.

A. Well, I built this machine as shown here.

Mr. SNYDER.—Witness referring to Defendant's Chicago Exhibit 128.

(Deposition of Thomas S. Leake.)

A. And when I got it completed, all I had was cinders. I put in cinders up there and it went up on the fifth floor of their building. Of course, it was not necessary to work all this rocking back and making it automatic. Everything worked but because I had the interference there I dropped it.

Mr. WUPPER.—Objected to as irrelevant and immaterial and as to alleged happenings taking place subsequent to the filing date of the application which resulted in the patent in suit.

Q. That was the same machine in theory, using new materials, but constructed in the same general design as the one you had used in New Orleans, was it not?

A. Oh, no; the New Orleans one had nothing automatic.

Q. But as far as applying the principle of controlling the mixture through the application of air and sending it to the higher point?

A. Oh, no. This takes air on the bottom and top both.

Q. In so far as it takes it out of the top, what can you say as to the operation as compared to the New Orleans operation?

A. Well, the New Orleans, all I did was push the air right out through, but this here has this turning down [560] this air and the air comes in on top.

Q. And both of them practically instantaneously discharge the contents at the upper point?

(Deposition of Thomas S. Leake.)

Mr. WUPPER.—Objected to as leading and calling for the opinion of the witness.

A. Yes.

Q. Do you know who now owns the patent maturing out of your application in interference?

A. No, I do not.

Q. Did you demonstrate the use, how this machine would work, at the Webster plant?

A. Yes; the vice-president, Mr. Perkins, I showed him I could put the cinders up on top.

Q. Was he convinced?

A. Yes; when he looked inside he found they were gone.

Q. What did he say about it before?

A. I couldn't say. Oh, he kind of thought I was just a bug, you know; intimated as though I was a bug; like everybody else, on patents.

Q. Thought it was too good to be true, something along that line? A. I suppose.

Q. About how far up was the outlet of the pipe in the Webster Building where you discharged the mixture?

A. That fifth floor? I don't know. I guess about 12-foot stories, about sixty feet.

Q. And about how high up did you succeed in discharging the mixture in New Orleans?

A. That was about thirty feet.

Q. About thirty feet? [561] A. Yes.

Q. And in both cases it was practically instantaneous?

A. Only the Webster it was not concrete.

(Deposition of Thomas S. Leake.)

Q. It was cinders? A. Yes.

Q. Would the same apply to concrete?

A. I couldn't say.

Q. The same way?

A. I couldn't say that. I don't know whether it would go up five stories high or not with concrete.

Q. Have you made any other structures to determine that? A. No, none whatever, I sold out.

Q. You sold out then? A. Yes.

Q. Did they use the cinders that you had blown through in the construction of the Webster building?

A. No, it was an old building, where they were making this stuff for me, this machine for me.

Q. How did you happen to sell out to Bliss? Did he come to you?

Mr. WUPPER.—Objected to as immaterial and irrelevant.

A. No, he came to my attorney.

Q. Your patent attorney? A. Yes.

Q. Do you remember his initials?

A. No; I do not.

Q. Do you remember who he was connected with?

A. Wilkinson—

Q. With whom? A. Sherwood & Wilkinson. [562]

Q. I mean Mr. Bliss.

A. No; I think he came from Washington. I think he was an attorney down in Washington; I never knew for sure.

(Deposition of Thomas S. Leake.)

Q. Have you got any of the machinery that you demonstrated out at the Webster plant?

A. No.

Q. Do you know where any of that is?

A. No; it was all scrapped, is the way I understand it. I never paid no more attention to it after I sold it.

Mr. SNYDER.—Defendant produces, introduces and offers in evidence the drawing Defendant's Chicago Deposition Exhibit 127.

(The exhibit was so marked.)

Mr. WUPPER.—The exhibit is objected to as incompetent, irrelevant and immaterial, not the best evidence and not proved as to the original.

Q. You made this drawing, did you not, Mr. Leake? A. Yes, sir.

Q. And that is the way it was when you made it? A. Yes, sir.

Mr. SNYDER.—It is stipulated that photostatic copy of the drawing Defendant's Chicago Deposition Exhibit 127 may be received in evidence in lieu of the original, the original to be produced upon demand of the Court or either party at any time.

Q. How large a pipe did you use down there in New Orleans? A. I think it was a four inch.

Q. The regular four-inch pipe? A. Yes.

Q. And how much pressure did you use, do you recall? [563]

A. No. I suppose about sixty or—

Q. Sixty-eight pounds, something like that?

(Deposition of Thomas S. Leake.)

A. Something like that. I wouldn't know for sure. That is only guesswork what I am saying there.

Q. You feel sure that would not be very far off?

A. Well, I think so, not very far off.

Mr. SNYDER.—You may ask him.

Cross-examination.

(By Mr. WUPPER.)

Q. Mr. Leake, referring to Defendant's Chicago Deposition Exhibit 127 you used the machine at New Orleans which is roughly sketched in this exhibit only as an experiment?

Mr. SNYDER.—I object to that as contrary to the record.

A. That is all.

Q. How many charges did you shoot up through the discharge pipe?

A. Probably three or four; maybe a half a dozen; I don't know.

Q. How long did it take for the material to go from the cylinder or chamber A up through the pipe? A. Instantaneously.

Q. To the discharge outlet?

A. Instantaneously.

Q. Please tell us exactly what materials you conveyed by this method.

A. I can't tell you exactly whether I had one, two and a half, five mixed with gravel, or one, two and a half or just sand, at this late date I can't tell. I was satisfied I could put the concrete up on top. [564]

(Deposition of Thomas S. Leake.)

Q. Did you use the same charge over again?

A. No. No. I don't think so. Possibly there was no cement in it, for all I know.

Q. Was it a wet mixture?

A. Oh, yes; it was wet, as I remember.

Q. But to your knowledge you do not know whether there was any cement in it or not?

A. No, I do not. It would look to me as though we were throwing it away, wasting it, if we put cement in there on just trying it out.

Q. And after these experiments were over you did nothing for several years with apparatus of this general type?

Mr. SNYDER.—I object to the question as suggestive, as calling for a conclusion.

A. I couldn't say how many years or anything about it.

Q. It was some extended period at least of a year or two?

Mr. SNYDER.—I object to that as argumentative, as to the form of the question.

A. It was probably two or three years before I built this machine. You see, you are going away back in history that I don't remember.

Q. Then we may assume that any dates you testified to here may be off?

A. Approximate dates.

Q. I believe you testified, Mr. Leake, that the preliminary statement forming a part of Defendant's Chicago Deposition Exhibit No. 130 was prepared by your attorney and that you would not re-

(Deposition of Thomas S. Leake.)

call ever having read it previous to reading it here?

A. No. Put up to me the same as you do to any client that [565] comes in and you tell him to sign it. That is all there is to it.

Q. Then if there were any errors in the preliminary statement they were the errors of your attorney?

Mr. SNYDER.—I object to the form of the question, the assumption of errors, there being no proof there were any.

A. I presume so.

Q. Approximately when was the original of which Defendant's Chicago Deposition Exhibit No. 128 is a copy prepared?

A. I couldn't tell you; I don't know.

Q. Could you give us an approximate date?

A. Well, I should say about '08, '07 or '08; latter part of seven or eight, something like that.

Q. Mr. Leake, did you build any other machines of this nature before you built the machine concerning which you testified you had installed at the Webster plant?

A. The little temporary one at New Orleans.

Q. That is the only one previous to this Webster machine? A. Yes.

Q. Referring to the outfit you had at New Orleans, where was that located?

A. At the Stuyvesant Docks.

Q. Was that on railroad property?

A. Yes, sir.

(Deposition of Thomas S. Leake.)

Q. All people except railroad employees were kept away from the vicinity of that machine?

A. I couldn't say that. I wouldn't say that. It would [566] be a pretty hard job to keep them off a mile and a half of right of way property along the river.

Q. To your knowledge were there any people there other than railroad or contractor employees at the time you made this test?

A. I couldn't say, I wouldn't say.

Q. Referring to your meeting in San Diego with some person with whom you discussed this matter do you recall that person's name? A. No, sir.

Q. Didn't he say whom he represented?

A. Southern Pacific, I believe, Railroad, or something like that, I am not sure.

Q. Have you seen him or heard from him since?

A. No.

Q. At that meeting you discussed all the things concerning which you testified to-day, did you not?

A. Well, I couldn't say whether I did or not.

Q. Did you discuss most of the things?

A. Some of them.

Q. Did you discuss the construction which you had, or the machine which you had had in New Orleans? A. Possibly I did.

Mr. WUPPER.—That is all.

Redirect Examination.

(By Mr. SNYDER.)

Q. When you were building this machine and testing it out down at New Orleans, it was on rail-

road property and you took no special precautions to exclude the public? [567]

A. No, I didn't think it was important enough for that.

Q. You said in answer to a question just asked you by Mr. Wupper, that you tested it out so that you were satisfied it would take concrete up to the roof.

Mr. WUPPER.—Objected to as calling for the conclusion of the witness.

A. Yes.

Q. If there is any question as *by* my accuracy in quoting the testimony, I would be glad to have the stenographer read it. It is correct, I think. A concrete mixture generally means that the mixture is wet, does it not?

A. Well, sometimes you put it in dry, like you put it under water, you *would it* in dry, wouldn't you, and run it down to the bottom.

Q. When you refer generally to a concrete mixture you refer to wet, generally?

A. We think it is so.

Q. That is what you had in mind when you said that you had satisfied your mind that it would transport the concrete satisfactorily? A. Yes.

Q. And if in 1907 or thereabouts you made certain statements in an application on interference proceedings that you had successfully demonstrated the transfer of concrete or cement satisfactorily, that would imply transferring a wet mixture, would it not? A. Yes.

(Deposition of Thomas S. Leake.)

Q. And any statements that you have made along about that time as to what you were doing in 1905 and the accuracy of the dates would be pretty apt to be correct, [568] wouldn't they?

A. They would be approximate; I wouldn't say accurate on account of going back twenty years, I couldn't do that.

Q. Have you any doubt now in mind that you were in New Orleans in connection with the Stuyvesant Docks in 1905 when you tested this out?

A. I haven't any doubt about it, but it could be, you know.

Q. And when you stated in your preliminary statement which you have just identified as made in May, 1909, that you built that plant there and did that work in 1905, that would be the accurate date, would it not?

A. I wouldn't say that; I don't know for sure, you know. I signed all these papers here for my attorney; I don't know.

Q. I would be safe in assuming that that was the actual date? A. I would think so, yes.

Mr. SNYDER.—That is all.

Recross-examination.

(By Mr. WUPPER.)

Q. You never used the material that you elevated by means of a machine which you built at New Orleans? A. Never used it?

Q. Yes. A. Used the machine or—

Q. Used the material which you elevated?

(Deposition of Thomas S. Leake.)

A. No. It didn't look reasonable that I would, you know. I imagine there was no cement in it because we were told not to waste stuff.

Q. That was just a matter of trying out? [569]

A. The air pipe.

Q. The air pressure to see if it would force the material through? A. Yes; that is all.

Mr. WUPPER.—That is all.

Redirect Examination.

(By Mr. SNYDER.)

Q. The effect would be the same whether there was cement in it or not? A. No, sir.

Q. So far as the action of the machine in throwing that up? A. No, sir.

Q. Whether there was or not, your being satisfied that it was satisfactory for moving it up led you to believe that the machine was sufficient for transporting and elevating concrete?

Mr. WUPPER.—Objected to as leading, calling for the conclusion of the witness, and also as matters concerning which the witness has not testified that he has had any experience.

A. It would handle so much smoother with cement in it. And it would stay together better.

Q. So that if it would send the mixture without the cement, it would do it that much easier and more readily with the cement in it?

Mr. WUPPER.—Same objection.

A. Yes.

Mr. SNYDER.—That is all.

(Deposition closed.) [570]

[Endorsed]: Lodged Jan. 7, 1928.

[Endorsed]: Filed Mar. 6, 1928. [571]

[Title of Court and Cause.]

ORDER APPROVING NARRATIVE OF TESTIMONY.

This cause coming on for hearing this 3 day of March, 1928, upon motion of the plaintiff for an order approving the statement of proceedings and narrative of testimony given at the trial of the above-entitled action, and it appearing to the Court that the amendments mentioned in the order of this Court entered on February 14, 1928, have been incorporated into and made a part of the said narrative,

NOW, THEREFORE, IT IS ORDERED that the said narrative of testimony as modified and amended under the direction of this Court be and the same is hereby approved and made a part of the record for the purposes of the appeal of the plaintiff.

Enter.

BOURQUIN,
Judge.

O. K. form.

CHADWICK, McM, R. & R.
For Deft.

[Endorsed]: Filed Mar. 3, 1928. [572]

[Title of Court and Cause.]

DECISION.

This infringement suit involves claims 1, 2, 17, 18, 24, 29, 34 and 35 of McMichael's patent 1,127,660, granted Feb. 9, 1915, on application filed Jan. 14, 1907. The usual defenses are interposed.

The answer alleges there are 10,000 patents in the art, cites one hundred, and there are an extraordinary number of references. For this, palliation is attempted by semi-apologetic "inability to forecast how they may be judged by the Court," which may be taken as a courteous expression of doubt of the Court's comprehension, or of fond hope that it may be deluded.

Of the claims in suit, 2, 17, 34 and 35 were held valid in Concrete etc. Co. vs. Corp., 12 Fed. (2) 929, 931. The record of that case —— differs from this at bar.

In the beginning McMichael's application was limited to "improvements in apparatus for transporting granular and plastic building material, such as sand, plaster, mortar and concrete."

Then as now, the apparatus consisted of an upright cylindrical container with hopper bottom terminating in a discharge pipe to the hopper connected by a U bend. Two separately controlled air pipes connected with the container, one at the top, the other near the bottom and pointing downward. The specification in description of function and operation stated that air "under any desired pres-

sure" admitted thru the upper pipe and over the material, by its pressure would force the latter downward and thru the discharge pipe; that as the material passed thru the U bend, it would be more or less [573] tightly packed, which would tend to "hold the water and the granular Material with which it is mixed intact, so that the tendency to flow the water out of the material is eliminated"; that "to loosen the material at the lower end of the hopper should the same become packed, I provide the additional air pipe adapted to discharge air through the material." Of six claims, one only related to the lower air and as follows: "an air pipe to deliver air at the lower end of the hopper, substantially as described." McMichael's prosecution of the application was dilatory to the limit of time, once incurring forfeiture.

After more than two years, interference was declared with Leake. The latter's application had been filed Oct. 7, 1907, and was for "improvements in a cement mixing and distributing system * * * for preparing a concrete mixture and delivering it."

Leake's apparatus contained all of McMichael, and more, but without the U-bend.

Its air pipes were a single control, and that for the lower air terminated in three nozzles opposed in one plane. In function and operation Leake's specification stated that the upper air would force the concrete down past the said nozzles, "where it

can be detached in portions and blown" into and thru the discharge pipe.

Several of his claims were variations of this, following, viz. "the method of conducting plastic material thru a closed conduit which consists in introducing the plastic material in a mass in a chamber connected to said conduit, introducing relatively compressed air behind the whole mass and behind a front portion thereof, and thereby detaching successive portions and driving them from the chamber into the conduit and along the latter."

For the purposes of interference, to McMichael the Commissioner suggested four claims including the claim aforesaid *verbatim* from Leake, which McMichael promptly accepted as substitutes for his six thereupon cancelled by him. The interference was not concluded for that plaintiff became assignee of both applications. Ultimately patents were granted for both, Leake's, 1,215,558, upon [574] Feb. 13, 1917; but whereas McMichael's contains the aforesaid claim *verbatim* from Leake and several like but of some difference in phraseology. Leake's, curiously enough, changed the form theretofore his own, but retained the substance. In the meantime, Bliss, of Washington, had become attorney for both applications, and Jan. 24, 1911, and later, in behalf of McMichael he filed very extensive amendments of specification and claims, increasing the latter to thirty-five.

In the course of these proceedings in McMichael (to which the comment in Greenwalt's case, 3 Fed.

(2) 660, is applicable), the invention is expanded to include method as well as apparatus, and by exclusion is restricted to only concrete. Altho the amended specification included the function originally ascribed to the lower air as aforesaid, it also declared that McMichael had "found" that the lower air is "very effective in aiding the passage of the material into and through" the discharge pipe; that "in cases where the friction" by the mass driven down by the upper air "is serious" the lower air "gives to the material the velocity which is needed to carry it to the remote point of delivery;" that it "acts upon the sub-masses successively * * * the results being thorough commingling of the ingredients" for that "the delivery pipe itself becomes a mixing chamber," but therein "the components are not driven apart or carried to different distances because of differences in specific gravity."

The amendments so far ignore the U bend so prominent in the original application and claimed *eo nomine*, that its function in respect to granular material in the original claimed, is eliminated along with all reference to granular material itself; and in only two or more claims of the patent is it indicated by the statement that the discharge pipe is "provided with a bend," without any function or effect ascribed to it, save that "the material will be more or less tightly packed as it is directed therethrough." The latter standing alone is not beneficial, and because detrimental the U bend in prac-

tice is no longer used or incorporated in the apparatus.

The amended specifications also stated that the upper air is the primary force, the pressure of which "compels the entire mass to escape into the pipe with great rapidity and force," thence assisted in discharge by the lower air.

In practice, the air pressure is maintained at one hundred pounds, and the container holds about two cubic yards or less [575] of concrete. The claims in issue are for apparatus and method in their various elements.

The charge of infringement against defendants is predicated upon their use of Hackley's apparatus, patent 1,619,297 of 1927. This latter is an oblong container, ovoid in cross-section, without upper air pipes, but having four lower air pipes. The discharge pipe is at the bottom and one end, and the disposition of the lower air pipes is entrance at the bottom, pointing towards the discharge pipe, one opening into the entrance of the latter, one opening into the opposite end of the container, and between them open the other two and equalizing the distances between all of them in order. In operation the container filled, the air is first admitted through the pipe opening in the entrance to the discharge pipe, and thereafter thru the others progressively, to the rear as the concrete subsiding in front of them is driven out thru the discharge pipe.

Plaintiff's contentions as they appear in its brief are that McMichael invented (1) the hopper bottomed container, (2) application of compressed air to convey concrete, and (3) the method of the lower air to detach portions of the concrete, which alternating with like slugs of air, are driven thru the discharge pipe.

In respect to the first, containers with hopper bottoms to direct the flow of their contents preceded McMichael for time so long, the memory of man runneth not to the contrary.

In respect to the second, long prior to McMichael were many devices more or less like his, in which the art of compressed air to convey mobile substances was developed and used. Whether or not it had yet been applied to concrete, to the latter is but a new and analogous use devoid of novelty or invention.

The affinity and analogy of concrete to other mobile substances commonly thus conveyed, was recognized by McMichael himself in his association of it with sand and other granular materials in his original application. This subsequent exclusion of all but concrete of those so associated, is suggestive of preparation for litigation [576] to come. To extend the art to concrete when it came into extensive use, not invention, but only common sense, to say nothing of ordinary mechanical skill to be expected in the progress of the art, was required. In principle, it differs none from like extension of the use of a wheelbarrow to convey concrete.

For a principle, appliance and method applied to substances in general, will naturally embrace any new substance, even as a statute relating to a genus will open to include newly created species.

The instant case cannot be distinguished in principle from Concrete etc. Co. vs. Gomery, 269 U. S. 177, wherein it is held that appliances and method of conveying mobile substances by gravity extended to concrete when it came into use, and a subsequent patent to thus convey concrete is invalid.

For gravity, substitute compressed air, and that case "reads on" this.

Moreover, prior to McMichael were patents for appliances and methods to convey concrete by the agency of compressed air. Amongst these are Smith, 122,498 of 1872, Cannif, 873,345 of 1906, and McIlvrid 958,421 of 1905.

In so far as it is argued that some of these are for grout, and will not function with less liquid concrete, the answer is they can be used for any practical flowable concrete, and they have been. They are of the simplicity of McMichael's, and even average intelligence will perceive their ability to operate successfully.

The variety of concrete is not material save in respect to the mere incidentals of pressure and size of container, load, and discharge conduit.

In any apparatus, including McMichael, the concrete must be flowable in quality, and the pressure in due proportion to the weight and friction of the

load ahead of it. To suit these incidentals to circumstances is mechanical and not invention.

And this is true, be the container capacity or load discharged in one slug (continuous stream) or in several shorter slugs.

Adverting to the third of plaintiff's contentions, the first observation is that the slug theory is not proven and is untenable. [577]

With one hundred pounds of air from the primary upper air pipe behind it, the concrete stands not on the order of its going but goes at once, and thru the discharge pipe "with great rapidity and speed."

In these circumstances the upper air does not halt until the lower air has neatly cut off and removed a slug of concrete, nor does the lower air, of like pressure from the common reservoir halt until within the field of its activity has been projected sufficient concrete to form any slug.

In the nature of things, the patent now stipulating what the application originally did not, viz., simultaneous and constant application of both upper the lower air, the lower air can but some disintegrate and aerate the mass of concrete as it rushes by, and thereby lubricate, lighten and assist its flow thru the conduit. The lower air but joins and flows in the same direction and with the stream of concrete.

It may be that if the upper and lower air were alternately applied, some *quasi*-slug action would follow, akin to the action of Saunders' "air-lift

pump," patent 597,023 of 1896, but not when simultaneously applied as here.

Taking McMichael as it is, to expect or secure movement of the concrete in alternate slugs of concrete and air would do violence to the laws of Nature and confound reason. It cannot be done.

Moreover, the proof is clear, by plaintiff's witness as by defendants' and some whom are interested in plaintiff, that the concrete discharges in a continuous aerated or mixed stream of concrete and air and not at all in any slug formation.

As between Wilkins' test discrediting the slug theory and Ray's supporting it, the former's is calculated to more nearly approach accuracy.

Evidently, McMichael "found" the basis of the slug theory in Leake and his claim aforesaid by the Commissioner presented to and adopted by McMichael. Until then, McMichael did not suggest that the lower air had any such function or result; until then, he limited the lower air in some undefined volume and pressure to only sometime use if the material chanced to pack in the hopper, to blow [578] thru the material and loosen it, in function, object and result, nothing but a convenient substitute for a crow-bar.

To thereafter broaden his claims to embrace the idea and method of Leake, avails McMichael nothing. See Hobbs vs. Beach, 180 U. S. 396. The impression irresistibly created by the facts is that after knowledge of Leake, all McMichael's amendments were to include Leake's idea and method, and to

exclude from McMichael's original application all possible that was inconsistent therewith.

Be that as it may, that in McMichael as in Leake the lower air serves a useful purpose, clearly appears; but as between them, in its present aspect in McMichael it is the idea and method of Leake and not McMichael, in that prior to McMichael, Leake had conceived the idea and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations.

For despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence in quality and quantity inspires confidence and constrains conviction of the truth of the fact and beyond reasonable doubt.

Neither of them, however, is inventor of the thing. Before them, it was old in the art.

Amongst many patents asserted to be anticipatory of the idea and use of the lower air, but three need be considered. Of these, the first and second are Duckham's English patents 4400 of 1875, and 15,348 of 1885. They are for apparatus and method to convey the spoil or mud excavated in dredging. To that end are employed a container for the material, compressed air above or behind it to drive it down to and thru the discharge pipe, and like air thru several nozzles in the bottom and pointing towards the discharge pipe, "to keep the mud agitated and prevent any thick deposit in the tank."

The third is Kolsche's German patent 18,394 of 1882 for "apparatus for conveying substances slack,

sandy, or granular material, by means of a current of air."

The apparatus is like McMichael's without the U bend. That is, it is an upright cylindrical container with hopper bottom terminating in a discharge pipe. Compressed air is applied above or behind the material in the container to force it down and into the discharge pipe, and at that point like air is admitted to assist in driving the material thru the pipe. [579]

Without any change, perhaps save adjustments to circumstances as always, Kolsche's apparatus and method will transport concrete as does McMichael's. Kolsche could rightfully devote it to that analogous use. It follows that McMichael's essentially unchanged application of Kolsche to analogous materials and uses, is not invention. In principle, essential design, function, operation, object and result, Kolsche and McMichael are one and the same. Either reads on the other.

Kolsche, if later and devoted to concrete, might infringe McMichael, and by the same token being earlier, he anticipates him.

The same is true of Duckham, especially in respect to McMichael's application originally, and their common use of the lower air to prevent or relieve packing of the material.

It must be remembered that the test of "analogous uses" is not from whence comes and where goes the materials, to what ultimate end or use, their nature, but is the method of conveyance. Although fertil-

izer and flour be unlike and for ends as wide apart as the poles, a wheelbarrow conveying both is devoted to analogous uses, in patent law.

In so far as the third contention counts upon nonseparation of the components in the discharge pipe, this result is imputed to nonexistent slug action and is inconsistent with the claim that the ingredients continue in active mixation thruout the pipe. But note that in the original application this function of the U bend was in relation to granular material only, and with the latter's elimination from the patent, the function was likewise eliminated.

It may be added that the nonseparation of components of plastic materials is due to that mutual cohesiveness which granular materials do not possess. All the elements of McMichael are old. It does not appear that he discovered, invented, combined or made anything new.

That serves to dispose of the case, and the defense of noninfringement needs no more consideration than to note that Hackley's apparatus is a different combination than McMichael's, has no upright cylindrical hopper bottomed container, is without the U bend, employs no upper air save some incidental back pressure, does not discharge slug fashion as claimed is the invention of McMichael, and so, does not infringe. Likewise, of the defense of insufficient supplemental oath to McMichael. It is noted that this was required by [580] the Commissioner, Feb. 18, 1911, was supplied by Bliss, Feb. 17, 1912, purports to have been

executed by McMichael, of Toledo, before Bliss, Jr., in Chicago, March 6, 1911, discloses in some lettering and spelling of McMichael's signature, striking differences from his signature to his application, applies to only part of the claim, and that McMichael sometime died.

The finding and conclusion are that the claims in suit are void for want of novelty and invention.

Decree accordingly.

Nov. 12, 1927.

BOURQUIN, J.

[Endorsed]: Filed Nov 12, 1927. [581]

In the United States District Court for the Western District of Washington, Northern Division.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY (a Partnership),

Defendants.

FINAL DECREE.

This cause came on to be heard at this term of court upon the pleadings, proceedings and proofs herein filed on behalf of both parties and was argued by counsel; and thereupon it is, upon consideration thereof,—

ORDERED, ADJUDGED AND DECREED by the Court that plaintiff take nothing by this suit and that the bill of complaint be and the same hereby is dismissed with costs to defendants in the sum of ——— to be taxed according to the rules and practice of this court, and that defendants have execution therefor.

BOURQUIN, J.

Dated: November 26, 1927.

Service of copy of the within final decree received this 19th day of November, A. D. 1927.

BATTLE, HULBERT & HELSELL,
For Plaintiff.

Filed Nov. 28, 1927. [582]

[Title of Court and Cause.]

PETITION FOR APPEAL.

To the Honorable Judges of the Above-entitled Court:

The above-named plaintiff, feeling itself aggrieved by decree made and entered in this cause on the 28th day of November, 1927, does hereby appeal from said decree to the Circuit Court of Appeals for the Ninth Circuit for the reasons specified in the assignment of errors, which is filed herewith, and it prays that its appeal be allowed and that citation issue as provided by law, and that a transcript of the record, proceedings and papers upon which said decree was based, duly authenticated may be sent to the United

States Circuit Court of Appeals for the Ninth Circuit at San Francisco, California; and your petitioner further prays that the proper order, touching the security to be required of it to perfect its appeal, be made, and desiring to supersede the execution of the decree, petitioner here tenders bond in such amount as the Court may require for such purpose, and prays that with the allowance of the appeal, a supersedeas be issued.

WILLIAMS, BRADBURY, McCALEB & HINKLE,
BATTLE, HULBERT & HELSELL,
Solicitors for the Plaintiff. [583]

The petition granted and the appeal allowed, and shall operate as a supersedeas upon petitioner filing a bond in the sum of Two Thousand and no/100 Dollars ($2,000.00) with sufficient surety, to be conditioned as required by law.

EDWARD E. CUSHMAN,
Judge.

Filed Dec. 8, 1927. [584]

[Title of Court and Cause.]

ASSIGNMENT OF ERRORS.

Now on this 8th day of December, 1927, came the plaintiff, by its solicitors, Williams, Bradbury, McCaleb & Hinkle and Battle, Hulbert & Helsell, and says: That the decree entered in the above cause on the 28th day of November, 1927, is erroneous and unjust to the plaintiff, because:

I.

Because the Court erred in dismissing the bill of complaint herein with costs to the defendant.

II.

The Court erred in ordering, adjudging and decreeing that the bill of complaint be dismissed.

III.

The Court erred in not granting the relief prayed for in the bill of complaint.

IV.

The Court erred in not finding the issues herein in favor of the plaintiff with costs against the defendant.

V.

The Court erred in holding claims 1, 2, 17, 18, 24, 29 [585] 34 and 35 void for want of novelty and invention.

VI.

The Court erred in not holding claims 1, 2, 17, 18, 24, 29, 34 and 35, or one or more of them, infringed by the defendants' device.

VII.

The Court erred in holding that the witness Leake had made invention in issue prior to McMichael's filing date.

VIII.

The Court erred in considering and holding that McMichael's or MacMichael's signature on supplemental oath is of doubtful genuineness.

IX.

The Court erred in holding claims of patent in suit void on file-wrapper record.

X.

The Court erred in holding that any prior art structure was capable of satisfactory concrete conveyance.

XI.

The Court erred in holding that McMichael's structure cannot secure movement of concrete in alternate slugs of concrete and air.

And during the trial the Court erred as follows:

XII.

The Court erred in refusing to permit H. B. Kirkland, a witness for the plaintiff, to testify and describe how a concrete lined tunnel is built, as follows:

> Q. I think I will ask you, Mr. Kirkland, to explain or describe, very briefly, how a concrete lined tunnel is built. [586] I do not want you to go into any elaborate detail.
>
> Mr. TOWNSEND.—I make the same objection, your Honor, that this is a patent that speaks for itself.
>
> The COURT.—Objection sustained.
>
> Mr. WILLIAMS.—I would like to have an exception.
>
> The COURT.—Noted.
>
> (Typewritten Record, p. 53; Printed Record, p. ——.)

XIII.

The Court erred in refusing to permit H. B. Kirkland to testify that the City of Seattle and the Engineers for the City of Seattle became interested in the pneumatic placement of concrete at the instance of the plaintiff; that they specified that it should be used on the job and that the contract was then let to R. C. Storrie & Company, as follows:

> Mr. WILLIAMS.—I want to show that it was at the instance of this plaintiff that the city and the engineers became interested in this pneumatic placement, and the answer to that will show that they specified that it should be used on the job and then the contracts were let to R. C. Storrie & Company and they used a method which we say is the infringing method.
>
> The COURT.—That is the only question, whether it was an infringing method or not. That is the only question. How they came to use it is immaterial. Objection sustained.
>
> Mr. WILLIAMS.—Exception I should like to have noted.
>
> (Typewritten Record, p. 63; Printed Record, p. ——.)

XIV.

The Court erred in refusing to admit in evidence as Plaintiff's Exhibit 21 the correspondence between H. B. Kirkland [587] and Mr. Uhden, City Engineer, as follows:

Q. Let me see, you referred to the correspondence you had with Mr. Uhden and produced that. I think I have neglected to offer it in evidence. I do offer it now as Plaintiff's Exhibit 21.

Mr. TOWNSEND.—The correspondence, I understand, was rejected.

Mr. WILLIAMS.—I beg your pardon?

Mr. TOWNSEND.—You were referring to the correspondence?

Mr. WILLIAMS.—Yes.

Mr. TOWNSEND.—That was rejected on objection.

The COURT.—It has not been offered before, I do not believe.

Mr. TOWNSEND.—I object to it on the ground that it is—

The COURT.—Sustained.

Mr. WILLIAMS.—Exception I would like, your Honor.

(Typewritten Record, p. 69; Printed Record, p. ——.)

XV.

The Court erred in refusing to allow plaintiff to interrogate O. W. Peterson, a witness on behalf of the defendant, as follows:

Q. Now since that time the Pacific Gas & Electric Company has used so-called Web-Cox machines on some of its work has it not?

A. One was used, not by the company but by a contractor.

Q. Doing work for the company?

A. Building a tunnel for the company, yes, sir.

Q. Was that machine like the one involved in the suit of this plaintiff against the Ulen Contracting Company [588] of New York, and as shown in the drawing which I now call to your attention?

Mr. TOWNSEND.—I object to that as not proper cross-examination.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Typewritten Record, p. 465; Printed Record, p. ——.)

XVI.

The Court erred in refusing to permit the plaintiff to interrogate O. W. Peterson, a witness on behalf of the defendant, as follows:

Q. Will you describe the Web-Cox machine which the Pacific Gas & Electric Company used, as you say?

Mr. TOWNSEND.—I object to that, your Honor.

The COURT.—Sustained.

Mr. WILLIAMS.—Exception.

(Typewritten Record, p. 465; Printed Record, p. ——.)

XVII.

The Court erred in refusing to permit the plaintiff to interrogate O. W. Peterson, a witness for the defendant, as follows:

Q. Now, why is it that the Pacific Gas & Electric Company in the placement of concrete

in connection with their tunnel work has not our machines? You have designated the Canniff grouting machines and tanks such as this Smith patent apparatus shown on defendant's photograph, Exhibits 184 and 185 if I may see them?

Mr. TOWNSEND.—I object to that, your Honor, as not proper cross-examination as to why.

The COURT.—Sustained. I do not see that it is [589] material.

Mr. WILLIAMS.—Exception.

(Typewritten Record, p. 468; Printed Record, p. ——.)

XVIII.

The Court erred in refusing to admit in evidence the file-wrapper showing the description of the application for the patent to Roy C. Hackley, No. 1,619,297. (Plaintiff's Exhibit 196 for Identification.)

(Typewritten Record, pp. 517, 518; Printed Record, p. ——.)

XIX.

The Court erred in sustaining the objection of the defendant to the offer of the plaintiff to prove that Hackley, when he filed the application and when he described his machine, described it exactly in accordance with the mode of operation which the plaintiff contends it to have, and that as a result of the filing of the suit a whole new specification and description was substituted.

(Typewritten Record, p. 517; Printed Record, p. ——.)

XX.

The Court erred in refusing to allow the plaintiff to interrogate Shirley Houghton, a witness on behalf of the plaintiff, as follows:

Q. Will you state whether or not a McMichael machine furnished by the plaintiff or its agent was delivered to the Pacific Gas & Electric Company under a contract entered into in 1916 and used by it in construction work and in the pneumatic placement of concrete in Placer County, California, following that date?

(Typewritten Record, p. 529; Printed Record, p. ——.) [590]

XXI.

The Court erred in refusing to allow the plaintiff to interrogate Shirley Houghton, a witness for the plaintiff, as follows:

Q. I will ask you whether the Pacific Gas & Electric Company paid royalties for the use of a McMichael machine so furnished in or about 1916 for the pneumatic placement of concrete in Placer County, California?

(Typewritten Record, p. 529; Printed Record, p. ——.)

XXII.

The Court erred in refusing to permit the plaintiff to interrogate Shirley Houghton, a witness for the plaintiff, as follows:

Q. Do you know whether subsequent to that date the plaintiff or its agent endeavored to lease to the Pacific Gas & Electric Company

McMichael machines for the pneumatic placement of concrete?

(Typewritten Record, p. 529; Printed Record, p. ——.)

XXIII.

The Court erred in refusing to permit the plaintiff to interrogate Shirley Houghton, a witness for the plaintiff as follows:

Q. Let me ask you a further question, whether, since the use of the McMichael machine in the Placer County job—the Auburn Tunnel—in about 1916 or '17 the Pacific Gas or Electric Company has used McMichael machines furnished by the plaintiff or its agents in the pneumatic placement of concrete in construction work which it has since been interested in?

(Typewritten Record, p. 530; Printed Record, p. ——.) [591]

XXIV.

The Court erred in refusing to permit the plaintiff to interrogate Frederick Ray, a witness on behalf of the plaintiff, as follows:

Q. Now in the question which I am about to ask you relative to the prior art, I wish you would assume that the public use by Shailer, McCormick and McIllvrid at New York, as attempted to be shown by the defendants' depositions involved a use in which fluid grout was pumped into the voids in concrete construction by means of a Caniff grouter or by means of a McIllvrid grouter. I wish you would

assume that the public use by R. A. Shailer and Thomas McCormick at New York involved,—that is, as covered by the depositions offered by the defendant—involved the use of a caisson which was sunk under the pressure of compressed air in which men worked on the floor of the open bottom of the caisson as it was lowered and that a discharge pipe extended outwardly from nearly the bottom of the caisson and sand and other material dug up by the workman were blown out through the discharge pipe by compressed air in the caisson.

I wish you would assume that the prior use No. 1, by the Union Sulphur Company and others at Sulphur, Crowley and New Orleans, Louisiana, involved the use in which water and oil and sand and gravel were pumped from wells by air lift pumps, the sand and gravel being held in suspension in the water or oil and carried along by the flow of the liquid, as much as fifty per cent of sand being entrained on some occasions, and that muddy water and mud were sometimes pumped from a hole thirty feet [592] deep by air lift pumps.

And I wish that you would assume that the prior use, No. 2, by the Union Sulphur Company, at Sulphur, Louisiana involved the use in which sulphur was melted by the application of hot water circulated in deep wells. This melted liquid sulphur having the consistency of rusty water or thin syrup, was pumped out

of the wells by air pumps and the sulphur was seen to have been discharged in spurts and that the sulphur was not pumped or transported except when in this liquid state.

And I wish that you would assume that the prior use by Willson, Cotton, Warner & Ring, at Miami, Florida, involved a use in which muck and clay-like marl was dredged from the bottom of a waterway by scooping the material, including a large amount of water, into a hopper; that the water with the entrained muck and marl was then sucked into a big cylinder by vacuum produced by condensing steam within the cylinder; that this material was then discharged from the cylinder through a long pipe eighteen inches in diameter, by supplying steam under pressure to the top of the cylinder and the manual valves being operated to control the intake by a discharge from the cylinder, and that water and muck occasionally included a stone or a piece of coral carried along in suspension by the water and mud.

I will, if you wish, if I have not done so, make copies of these assumed hypotheses available.

Now, with that in hand and with the patents and the publications of the prior art in mind, I wish you [593] would state whether it is possible in your opinion in some manner or degree to classify those disclosures and uses of what is said to be the prior art, and if so

to state what the line or lines of that classification are?

(Typewritten Record, pp. 552–554, inclusive; Printed Record, p. ——.)

XXV.

The Court erred in refusing to permit the plaintiff to interrogate Frederick Ray, a witness for the plaintiff, as follows:

Q. Will you explain to the Court, Mr. Ray, the mode of operation of the device and apparatus disclosed in the patents and publications which have been offered in evidence by the defendants here in alleged exemplification of the prior art?

(Typewritten Record, p. 555; Printed Record, p. ——.)

XXVI.

The Court erred in sustaining objection to the offer of the plaintiff as follows:

Mr. WILLIAMS.—On behalf of the plaintiff, if the Court please, I offer to prove by this witness that all of the patents, publications and prior uses offered in evidence by the defendant, and shown or intended to be shown by the depositions fall into two classes; first a class in which merely the flow of liquid is involved or the flow of materials, which follow the laws of liquids in equal distribution of their hydrostatic pressure and in every respect conforming to the flow of liquids. And a second group in which dry pulverant material, such as cement or sand, or gold-dust are car-

ried along [594] in suspension by more or less rapidly moving streams of air or stream or other gas and that in the class involving the flow of liquids and the principles relating to the flow of liquids, there are in some instances examples of entrained material—mud, sand, gravel, sometimes occasionally rock in the mud, dredged from the bottom of a waterway, or a piece of coral dredged from the bottom of a waterway, which is carried along in suspension by the liquid-like material, and that these materials thus carried in suspension where they are finely pulverant material carried along in an air stream or sand or other material carried in a stream of liquid or fluid are in those cases carried wholly by the kinetic energy or by the velocity of the moving stream. That they are *not carried by pressure.* I offer to make that proof by this witness.

(Typewritten Record, pp. 555, 556; Printed Record, p. ——.)

XXVII.

The Court erred in refusing to allow plaintiff to interrogate Frederick Ray, a witness for the plaintiff as follows:

Q. Will you state what scientific principle or principles are involved in the conveyance of the coal dust, sand or other granules there described as being carried or transported by the means there disclosed?

(Typewritten Record, p. 556; Printed Record, p. ——.)

XXVIII.

The Court erred in refusing the offer of the plaintiff to prove that in the case of the Kolsche German patent the materials there described are carried, if at all, wholly by the [595] kinetic energy or velocity of a moving air stream.

(Typewritten Record, p. 557; Printed Record, p. ——.)

XXIX.

The Court erred in refusing to allow the plaintiff to interrogate Frederick Ray, a witness for the plaintiff, in reference to the Sickles patent No. 99,360, as follows:

Q. Will you state whether or not the conveyance or removal of sand from the bottom of the caisson there shown is in accordance with the mode of operation like that disclosed in the structure of the McMichael patent in suit, or upon some other and different principle.

(Typewritten Record, p. 557; Printed Record, p. ——.)

XXX.

The Court erred in sustaining the objection of the defendant to the following question propounded to Frederick Ray, a witness for the plaintiff:

Q. Will you look, Mr. Ray, please, at the Warren patent No. 671,302, sand blast apparatus and state whether or not the sand there described as being shot through the blast conduit is moved by the kinetic energy of the molecules by air impinging upon the several particles of sand or by some pressure, the

operation comparable with that involved in the operation of the McMichael apparatus.

(Typewritten Record, p. 558; Printed Record, p. ——.)

XXXI.

The Court erred in sustaining the defendants' objection to the following question propounded by the plaintiff to Frederick Ray, a witness for the plaintiff: [596]

Q. Mr. Ray, will you look at the following group of patents namely, Smith patent No. 122,498 and particularly at the package which refers to the amount of liquid concrete which has a consistency such that it will settle to a perfectly level surface; the Golvie patent, No. 676,128, wherein the shooting of grout is described; the Golvie patent No. 676,129, wherein the flow of grout is involved; the Moir patent, 778,878, wherein the movement of fluid lime grout is described; the Thomas patent, No. 873,345, involving a grouting machine and the McIllvrid patent No. 958,421, disclosing a machine for the flow of grout, and state, if you will, whether there is in those machines, or in their operation or their construction, anything comparable with the mode of construction or the mode of operation of the McMichael patent in suit.

(Typewritten Record, p. 558; Printed Record, p. ——.)

XXXII.

The Court erred in sustaining the objection of

the defendants to the question propounded to Frederick Ray, a witness on behalf of the plaintiff, as follows:

Q. I wish, Mr. Ray, you would look at the patent showing lift pump for the flowing by liquids, exemplified in the following publications of patents offered by the defendant, namely, Pohle patents No. 487,639, disclosing the pumping of water; Saunders patent No. 597,023, disclosing the pumping of water; Frasch patent No. 799,642 disclosing the pumping of liquified or molten sulphur; Frasch patent No. 800,127, disclosing the pumping of liquid and molten sulphur; Rix and Donahoo patent No. [597] 635,270 disclosing the pumping of dredged water and entrained water or "spoil" the Frizell patent, No. 233,499, disclosing the pumping of water; the Harris patent No. 759,100 disclosing the pumping from deep wells of fluids such as water or oil, and the Harris patent No. 814,601 disclosing the pumping of water, and I will ask you to state whether any of those patents disclose the transportation of material having the arch forming possibilities or characteristics of concrete forming material, or whether they disclose any other principle or mode of operation such as that involved in the structure and mode of operation of the McMichael patent in suit?

(Typewritten Record, p. 559; Printed Record, p. —.)

XXXIII.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

> Q. Mr. Ray, I will ask you to look at the following patents offered in evidence by the defendants and describing the movement of entrained and suspended solids in water or other liquids, particularly Duckham British patent No. 4,400, of 1875 disclosing the liquid flow of mud or entrained spoil with water from dredges; Duckham British patent No. 15,348 of 1885 disclosing the transportation or flow of water with entrained mud or spoil from dredges; the Hussey & Harson patent No. 497,427, disclosing the flow of mud from dredges, including gravel and sand and debris in the water or entrained in the water; Hussey [598] patent No. 526,530, disclosing the pumping of water and muck from dredges, including ground, gravel and other debris, entrained and carried in suspension in the water; the Rix and Donahoo patent No. 635,270 disclosing the pumping of water and spoil from dredges with the entrained material and the patent of Church No. 487,606, disclosing the pumping and the atomizing and the spraying of alabastrine steel paint or a mixture of alabastrine paint and water, forming a paint-like consistency, for painting or coating the sides of buildings by means of a spray nozzle and I ask you to state whether in connection with

those patents—or whether any of them disclose the mode of operation and particularly the formation of slugs in the discharge duct in a manner comparable with that involved in the operation of the apparatus disclosed in the McMichael patent in suit.

(Typewritten Record, p. 560; Printed Record, p. —.)

XXXIV.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Mr. Ray, I ask you to look at Church patent 487,606 and Rix and Donahoo patent No. 635,270 and ask you to note that they both describe so-called ejectors or injectors. I will ask you to state what the scientific principles are involved in the operation of such ejectors or injectors.

(Typewritten Record, pp. 560, 561; Printed Record, p. —.) [599]

XXXV.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Let me ask you, Mr. Ray, whether these patents do disclose ejectors or injectors or devices acting and operating upon the principles of ejectors or injectors.

(Typewritten Record, p. 561; Printed Record, p. ——.)

XXXVI.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Let me ask you, Mr. Ray, whether any of the devices disclosed in any of these patents or publicatons offered by the defendant are conforming to the assumption which I have asked you to make relative to the claim of prior uses—whether any of those apparatuses could be used or adapted to be used successfully in the transportation or placement of concrete if they were supplied with concrete forming materials of the character contemplated by the McMichael patent in lieu of the materials which they are described as having been intended to handle and without making any changes or modifications in the structure disclosed.

(Typewritten Record, p. 562; Printed Record, p. —.)

XXXVII.

The Court erred in sustaining the objection of the defendants to the question propounded to Mr. Frederick Ray, a witness for the plaintiff, as follows: [600]

Q. Do you find, Mr. Ray, in any of the patents or publications or assumed uses of the prior art as I have described them a device or means of placing materials of any character, including a vessel, or comprising a vessel for containing the materials in a body with pres-

sure maintained behind the body of the materials, but forcing them into a restricted outlet and a pressure jet, acting to inject air into the materials in the general direction of the outlet?

(Typewritten Record, p. 562; Printed Record, p. —.)

XXXVIII.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Do you find in any of these things, Mr. Ray, a device involving means for causing a jet of air to impinge upon such successive portions of the masses in a vessel such as those disclosed or described in the McMichael patent in the general direction of the discharge duct to control or assist in the formation of the sub-masses through them?

(Typewritten Record, p. 562; Printed Record, p. —.)

XXXIX.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Will you state, Mr. Ray, the mode of operation and the principles involved in the operation of a so-called air lift pump of the character disclosed in several of the patents and publications and the testimony, as you may [601] assume it, of the witnesses, by these depositions.

(Typewritten Record, p. 563; Printed Record, p. —.)

XL.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. I will ask you whether any principle or mode of operation involved in the operation of these air lift pumps for the handling of any or all of such liquids as are mentioned or described in the patents is comparable in any way with the mode of operation involved in the operation of the McMichael patent?

(Typewritten Record, p. 562; Printed Record, p. —.)

XLI.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. Now, Mr. Ray, can you suggest a reason why the Canniff structure as shown in the patents would be a desirable one for promoting the flow of such a liquid or fluid material as grout?

(Typewritten Record, p. 564; Printed Record, p. —.)

XLII.

The Court erred in sustaining the objection of the defendants to the question propounded to Frederick Ray, a witness for the plaintiff, as follows:

Q. I think I will ask you whether there is any suggestion in the Canniff patent of such a change as is incorporated in the defendant s

Exhibit 179 apparatus, [602] or whether in any of the other publications or disclosure patents or the prior art there is any suggestion of such a change for bringing about a different mode of operation, or otherwise.

(Typewritten Record, p. 565; Printed Record, p. —.)

XLIII.

The Court erred in sustaining the objection of the defendants to the questions propounded to Arthur P. Robinson, a witness for the plaintiff, as follows:

Q. Let me ask you, however, what was the experience of your Company, the Ransome Company in connection with its effort to make a concrete mixing and conveying device and which resulted in the thing which is here, as I presume, called the Ransome Canniff machine.

(Typewritten Record, p. 582; Printed Record, p. —.)

WHEREFORE, the plaintiff prays that the said decree be reversed and the District Court be directed and instructed to enter such decree as prayed for by said bill of complaint, or that the said Circuit Court of Appeals shall reverse and render a proper decree on the record.

WILLIAMS, BRADBURY, McCALEB & HINKLE,

BATTLE, HULBERT & HELSELL,

Solicitors for the Plaintiff. [603]

United States of America,
State of Washington,
County of King,—ss.

Frank P. Helsell, being first duly sworn, on oath, deposes and says; That he is one of the solicitors for the plaintiff above named; that he has read the foregoing assignment of errors, knows the contents thereof, and that the same are true and correct.

FRANK P. HELSELL.

Subscribed and sworn to before me this 8th day of December, 1927.

[Seal] FRIEDA CASWELL TOSTEVIN,
Notary Public in and for the State of Washington,
Residing at Seattle.

Filed Dec. 8, 1927. [604]

[Title of Court and Cause.]

BOND ON APPEAL.

KNOW ALL MEN BY THESE PRESENTS, That we, Concrete Mixing and Conveying Company, a corporation, as principal, and Standard Accident Insurance Company, a corporation, as surety, acknowledge ourselves to be jointly indebted to R. C. Storrie and Company, a partnership, appellee in the above cause, in the sum of Two Thousand no/100 Dollars ($2,000.00), conditioned that

WHEREAS, on the 28th day of November, 1927, in the District Court of the United States for the

Western District of Washington, in a suit pending in that court wherein Concrete Mixing and Conveying Company, was plaintiff, and R. C. Storrie & Company, a partnership, was defendant, numbered on the equity docket as 394, a decree was entered against the said Concrete Mixing and Conveying Company dismissing the bill of complaint with costs to the defendant, and the said Concrete Mixing and Conveying Company having obtained an appeal to the Circuit Court of Appeals and having filed a copy thereof in the office of the Clerk of the court to reverse the said decree, and a citation directed to said R. C. Storrie & Company citing and admonishing them to be and appear at a session of the United States Court of Appeals for the Ninth *District,* to be holden in the city of [605] San Francisco, State of California, not more than thirty (30) days from the date of said citation.

NOW, If the said Concrete Mixing and Conveying Company, a corporation, shall prosecute its appeal to effect and answer all damages and costs if it fail to make its plea good, then the above obligation to be void, else to remain in full force and virtue.

CONCRETE MIXING AND CONVEYING COMPANY.

By BATTLE, HULBERT and HELSELL,
Its Attorneys,

STANDARD ACCIDENT INSURANCE COMPANY.

[Seal] By EVART LAMPING,
Its Attorney-in-fact.

#1828.

State of Washington,
County of King,—ss.

On this 13 day of December, A. D. 1927, before me personally appeared Evart Lamping, to me known to be the attorney-in-fact of the Standard Accident Insurance Company, the corporation that executed the within and foregoing instrument and acknowledged said instrument to be the free and voluntary act and deed of said corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument and that the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year first above written.

[Seal] GEO. F. FITZGERALD,
Notary Public in and for the State of Washington,
Residing at Seattle.

Bond O. K.

CHARLES E. TOWNSEND,
WM. A. LOFTUS,
S. F. CHADWICK,
Attorneys for Defendant.

The foregoing bond approved this 13th day of December, 1927.

JUDGE CUSHMAN,
Judge.

Filed Dec. 13, 1927. [606]

[Title of Court and Cause.]

ORDER DIRECTING TRANSMISSION OF EXHIBITS TO CLERK OF CIRCUIT COURT OF APPEALS.

This cause coming on to be heard upon the plaintiff's motion that the original paper exhibits be sent by the Clerk of this court to the Circuit Court of Appeals,—

NOW, THEREFORE, IT IS ORDERED, that all of the exhibits, documentary and otherwise, admitted in evidence, including those accompanying the several depositions of the defendants, and also all exhibits marked for identification in the above-entitled action be transmitted by the Clerk of this court to the Circuit Court of Appeals in San Francisco, California, for reproduction so far as is necessary, by the Clerk of the said Circuit Court of Appeals, provided printing not waived unless the C. C. A. so orders.

Enter.

BOURQUIN,
Judge.

[Endorsed]: Filed Feb. 14, 1928. [607]

[Title of Court and Cause.]

PRAECIPE FOR TRANSCRIPT OF RECORD.

To the Clerk of the Above-entitled Court:

You will please prepare a transcript of the record

in this cause to be filed in the office of the Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, upon the appeal allowed December 8th, 1927, and include in the said transcript the following pleadings and papers on file, to wit:

(1) Placita.

(2) Bill of complaint.

(3) Defendant's motion to strike paragraph 5 of the bill of complaint.

(4) Order of Neterer, J., dated May 23, 1924, striking paragraph 5 of the bill of complaint.

(5) Answer.

(6) Amendment to answer.

(7) Order denying defendant's motion for continuance, and directing defendant to file bill of particulars.

(8) Defendant's bill of particulars. [608]

(9) Narrative of testimony of Roy C. Hackley, R. C. Oxenham, Shirley Houghton, H. B. Kirkland, Arthur Robinson, O. R. Brock, Frederick Ray, for plaintiff, and narrative of the testimony and depositions of Philip L. Wilson, George T. Warner, Ernest Cotton, Julian A. Sohon, James McIlvrid, Harry C. LaPorte, Clinton H. Crooks, Joseph C. Rowell, H. L. Terwilger, T. J. McCormick, Roy C. Hackley, Roy Wilkins, O. W. Peterson, for defendant.

(10) Deposition of William H. Larkin, Jr., for defendant (*pro hac verba*).

(11) Deposition of Thomas S. Leake, for defendant (*pro hac verba*).

(12) Opinion of Bourquin, Judge.

(13) Final decree.

(14) Petition for appeal.

(15) Assignment of errors.

(16) Order allowing appeal.

(17) Citation.

(18) Appeal bond.

(19) This praecipe.

(20) Notice to defendant that plaintiff has filed this praecipe and narrative of certain testimony and depositions.

(21) Order of Court approving narrative of testimony and depositions and directing the depositions of William H. Larkin, Jr., and Thomas S. Leake be transmitted to the Clerk of the Court of Appeals *pro hac verba.*

(22) Clerk's certificate of transcript of record.

(23) Plaintiff's paper exhibits as follows:

(1) Articles of incorporation of plaintiff [609] company.

(2) Certificate of good standing of plaintiff company.

(3) Certified copy of letters patent in suit to McMichael.

(5) Certified copy of opinion Judge Learned Hand in Conveying Company vs. Ulen.

(7) Certified copy opinion Judge Augustus N. Hand in Conveying Company vs. Ulen.

(9) Certified copy mandate in cause No. 26235.

(11) (Excerpt from) opinion of Judge Augustus N. Hand in Conveying Company vs. Powers-Kennedy, being the opinion appearing on pages 417–418 of the record in said cause, offered herein as Plaintiff's Exhibit No. 11.

(12) Hackley file-wrapper (reproduce entire file-wrapper).

(13) Drawing.

(14–A) Photograph.

(14–B) Photograph.

(14–C) Photograph.

(14–D) Photograph.

(15–A) Drawing

(15–B) Drawing.

(16) Photograph.

(17–A) Drawing.

(17–B) Drawing.

(19) List of jobs where plaintiff's apparatus was used.

(21) (For identification) Correspondence between plaintiff and Mr. Uhden.

(22) Photograph small type McMichael Machine made by Ransome Company.

(23) Blue-print small type McMichael machine made by Ransome Company. [610]

(24) Photograph larger type McMichael machine made by Ransome Company.

(26) List of jobs where Ransome type McMichael machine was used.

(197) Blue-print and attached instructions Canniff grouting machines.

(198) Drawing early type Ransome machine.

(199) Instructions on early type Ransome machine.

(200) Photograph McMichael Machine.

(201) Photograph.

(202) Photograph.

(203) Photograph showing gauges.

(209) Patents to supplement McMichael file-wrapper.

(24) Defendant's paper exhibits as follows:

(29 Minutes Proceedings Institutions Civil Engineers.

(30 Minutes Proceedings Institutions Civil Engineers.

(134) Certified copy file-wrapper and contents McMichael patent.

(135) File-wrapper Leake patent.

(136) Assignment from Leake to plaintiff.

(140) Copy Smith patent No. 122,497.

(141) Copy Smith patent No. 122,498.

(142) Copy Goodrich Patent No. 317,337.

(143) Copy Goldie patent No. 676,128.
(144) Copy Goldie patent No. 676,191.
(145) Copy Goldie patent No. 707,841.
(146) Copy Moir patent No. 778,878.
(149) Copy Canniff patent No. 873,345.
(151) Copy McIlvrid patent No. 958,421.
[611]
(152) Copy Pohle patent No. 487,639.
(153) Copy Saunders patent No. 597,023.
(155) Copy Frasch patent No. 799,642.
(156) Copy Frasch patent No. 800,127.
(157) Copy Duckham patent No. 4,400 (British).
(158) Copy Duckham patent No. 15,348 (British).
(159) Copy Sickles patent No. 99,360.
(160) Copy Rix & Donahoo patent No. 635,280.
(161) Copy Church patent No. 487,606.
(163) Copy Frizzell patent No. 233,499.
(164) Copy Harris patent No. 759,100.
(165) Copy Harris patent No. 814,601.
(166) Copy Warren patent No. 671,302.
(167) Copy Butler patent No. 660,946.
(168) Copy Kolsche German patent No. 18,394.
(169) Copy Hussey patent No. 497,427.
(170) Copy Hussey patent No. 526,530.
(175) Drawing McCormick machine.
(181) Photograph of Grout gun.
(182) Photograph of Grout gun.

(183) Photographs.
(184) Photograph.
(185) Photograph.

You will also please transmit and certify to the Circuit Court of Appeals original exhibits other than those specified above to be transmitted and certified as physical exhibits, as follows:

(PLAINTIFF'S EXHIBITS.)

(4) Record in Conveying Company vs. Ulen Contracting Company. [612]
(11) Record in Concrete Mixing Co. vs. Powers-Kennedy.
(18) (For identification) Book of photographs.
(20) Piece of concrete.
(204) Gauge.
(205) Timing mechanism.
(206) Five charts.
(207) Boxes containing six rolls and fifteen dials.
(208) Impact recording machine.

(DEFENDANT'S EXHIBITS.)

(179) Canniff machine.
(186) Smith machine.
(188) Drawing testing apparatus.
(189) Oscillograph.
(190) Movie film.
(191) Movie film print.
(192) Movie film print.
(193) Sample of mix.
(194) Sample of mix.

Said transcript to be prepared as required by law and the rules of the United States Circuit Court of Appeals for the Ninth Circuit.

WILLIAMS, BRADBURY, McCALEB & HINKLE,
BATTLE, HULBERT & HELSELL,
Solicitors for Plaintiff.

Filed Jan. 7, 1928. [613]

[Title of Court and Cause.]

DEFENDANT'S PRAECIPE FOR TRANSCRIPT OF RECORD.

To the Clerk of the Above-entitled Court:

In addition to all the pleadings, papers, documents and exhibits specified and included in plaintiff's praecipe for transcript of record, defendants pray that there be included in said record on appeal the several amendments, corrections and additions to plaintiff's suggested condensation and embodied in the accompanying *addendum* for condensation of record on appeal; together with the following papers and matters of record in the court and not included in plaintiff's praecipe, to wit, depositions of the following witnesses omitted from defendant's narrative:

(1) William Keever, S. W. Maxwell, Hicklen J. Landers, John Green, Joseph G. Medlenka, Jac. Frankel and Edmund F. Ivens.

(2) Each and all exhibits, documentary and otherwise, introduced by defendants, including those

accompanying the several depositions of defendants and also all defendant's exhibitis marked for identification.

(3) This praecipe.

(4) Defendant's demand under Rule 58 that plaintiff admit in writing genuineness of publications. [614]

(5) Notice of invitation by defendants to plaintiff in this case to witness defendant's tests on Wednesday September 7, 1927, at San Francisco, Calif., and endorsements thereon.

CHAS. E. TOWNSEND,
WM. A. LOFTUS,
S. F. CHADWICK,
Solicitors for Defendants.

Dated: January 26th, 1928.

[Endorsed]: Received Jan. 26, 1928.
BATTLE, HULBERT & HELSELL,

[Endorsed]: Filed Jan. 26, 1928. [615]

[Title of Court and Cause.]

CERTIFICATE OF CLERK U. S. DISTRICT COURT TO TRANSCRIPT OF RECORD.

United States of America,
Western District of Washington,—ss.

I, Ed. M. Lakin, Clerk of the United States District Court for the Western District of Washington, do hereby certify this typewritten transcript of record, consisting of pages numbered from 1 to 615,

inclusive, to be a full, true, correct and complete copy of so much of the record, papers, and other proceedings in the above and foregoing entitled cause, as is required by praecipes of counsel for plaintiff and defendant filed and shown herein, as the same remain of record and on file in the office of the Clerk of said District Court, and that the same constitute the record on appeal herein from the judgment of the said United States District Court for the Western District of Washington to the United States Circuit Court of Appeals for the Ninth Circuit.

I further certify the following to be a full, true and correct statement of all expenses, costs, fees and charges incurred and paid in my office by or on behalf of the appellant herein, for making record, certificate or return to the United States Circuit Court of Appeals for the Ninth Circuit in the above-entitled cause, to wit: [616]

Clerk's fees (Act of Feb. 11, 1925) for making record, certificate or return, 1602 folios at 15¢	$240.30
Certificate of Clerk to transcript of record, with seal	.50
Certificate of Clerk of original exhibits, with seal	.50
Total	$241.30

I hereby certify that the above cost for preparing and certifying record, amounting to $241.30 has been paid to me by solicitors for appellant.

I further certify that I hereto attach and herewith transmit the original citation issued in this cause.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said District Court, at Seattle, in said District, this 14th day of March, 1928.

[Seal] ED. M. LAKIN,
Clerk United States District Court, Western District of Washington.

By S. E. Leitch,
Deputy. [617]

In the District Court of the United States, for the Western District of Washington, Northern Division.

IN EQUITY—No. 394.

CONCRETE MIXING AND CONVEYING COMPANY,

Plaintiff,

vs.

R. C. STORRIE & COMPANY (a Partnership),

Defendants.

CITATION.

United States of America to R. C. Storrie & Company, a Partnership, GREETING:

YOU ARE HEREBY NOTIFIED that in a certain case in equity in the United States District Court in and for the Western District of Washing-

ton, wherein Concrete Mixing and Conveying Company, is complainant, and R. C. Storrie & Company, a partnership, are defendants, an appeal has been allowed the complainant therein to the Circuit Court of Appeals for the Ninth Circuit.

You are hereby cited and admonished to be and appear in said court at San Francisco, California, thirty (30) days after the date of this citation, to show cause, if any there be, why the order and decree appealed from should not be granted and speedy justice done the parties in that behalf.

WITNESS the Honorable EDWARD E. CUSHMAN, Judge of the United States District Court, for the Western District of Washington, this 8th day of December, 1927.

[Seal] EDWARD E. CUSHMAN,
District Judge.

Copy of foregoing citation received this 8th of December, 192—.

CHADWICK, McMICKEN, RAMSEY & RUPP,

J.,
Attorneys for Defendant.

[Endorsed]: Filed Dec. 8, 1927. [618]

[Endorsed]: No. 5425. United States Circuit Court of Appeals for the Ninth Circuit. Concrete Mixing and Conveying Company, a Corporation, Appellant, vs. R. C. Storrie & Company, a Partnership, Appellee. Transcript of Record. Upon Ap-

peal from the United States District Court for the Western District of Washington, Northern Division.

Filed March 16, 1928.

F. D. MONCKTON,
Clerk of the United States Circuit Court of Appeals for the Ninth Circuit.

By Paul P. O'Brien,
Deputy Clerk.

[Endorsed]: Printed Transcript of Record. Vols. I and II. Filed April 21, 1928. Paul P. O'Brien, Clerk.

No. 5425

United States
Circuit Court of Appeals
For the Ninth Circuit.

CONCRETE MIXING AND CONVEYING COMPANY, a Corporation,

Appellant,

vs.

R. C. STORRIE & COMPANY, a Partnership,

Appellee.

Upon Appeal from the United States District Court for the Western District of Washington, Northern Division.

PROCEEDINGS HAD IN THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT.

At a stated term, to wit, the October Term, A. D. 1927, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Thursday, the thirty-first day of May, in the year of our Lord one thousand nine hundred and twenty-eight. Present: Honorable WILLIAM B. GILBERT, Senior Circuit Judge, Presiding; Honorable FRANK H. RUDKIN, Circuit Judge; Honorable FRANK S. DIETRICH, Circuit Judge.

[Title of Cause.]

ORDER OF SUBMISSION.

ORDERED above cause argued by Mr. Lynn A. Williams, counsel for the appellant, and by Mr. Charles E. Townsend, counsel for the appellee, and submitted to the Court for consideration and decision, with leave to counsel for the appellant to file a reply brief within fifteen (15) days from date.

At a stated term, to wit, the October Term, A. D. 1927, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Monday, the twentieth day of August, in the year of our Lord one thousand nine hundred and twenty-eight. Present: Honorable WILL-

IAM H. HUNT, Circuit Judge, Presiding; Honorable HAROLD LOUDERBACK, District Judge.

[Title of Cause.]

ORDER DIRECTING FILING OF OPINION AND FILING AND RECORDING OF DECREE.

By direction of the Honorable William B. Gilbert, Frank H. Rudkin and Frank S. Dietrich, Circuit Judges, before whom the cause was heard, ORDERED that the typewritten opinion this day rendered by this Court in above cause be forthwith filed by the Clerk and that a decree be filed and recorded in the minutes of this Court in accordance with the opinion filed.

[Title of Court and Cause.]

OPINION U. S. CIRCUIT COURT OF APPEALS.

Before GILBERT, RUDKIN and DIETRICH, Circuit Judges.

The appellant brought a suit alleging infringement of Claims 1, 2, 17, 18, 24, 29, and 35 of patent No. 1,127,660, issued February 9, 1915, to John H. McMichael, Assignor, for a "Method of, and an apparatus for, transporting and treating concrete." The application was filed January 14, 1907, and was pending in the Patent Office more than eight years. As originally filed, the application was for

"Improvements in apparatus for transporting granular and plastic building material such as sand, plaster, mortar, and concrete." The apparatus as patented consists of a vertical closed cylinder tapering toward the base to discharge into a U-bend connected with a conduit having an air nozzle at the top of the cylinder and an air nozzle near the entrance to the U-bend, each separately controlled, under pressure of which the concrete material in the chamber is forced through the conduit and carried to the point where it is to be deposited. It was claimed that the appellee infringed by use of the device described in letters patent No. 1,619,297, issued March 1, 1927, to Roy C. Hackley, for a "Concrete Gun," which consists of a horizontal disposed oblong tank, ovoid in cross-section, with the narrow portion disposed downwardly and with a tapering nozzle to which is connected a discharge pipe for conveying the concrete. Air pressure is furnished by four air supply pipes extending within and along the bottom of the container and terminating at different points intermediate the ends of the tank. Into the pipe which terminates nearest the exit the air is first admitted and thereafter into the others in their order until all the concrete is driven into the discharge pipe. In the specifications it is said that the pipe which terminates near the nozzle insures that pressure shall always be present there directing the concrete into the discharge pipe, and that the remaining pipes serve to advance the body of concrete along the bottom of the tank until

the tank is completely emptied. The containers in both the appellant's and the appellee's patents are filled with concrete through openings in the top which are then closed by airtight lids. At the close of the trial the court below found the appellant's patent anticipated and invalid, and that, even conceding its validity, it had not been infringed by the appellee, Concrete Mixing & Conveying Co. vs. R. C. Storrie & Co., 23 Fed. (2d) 131.

GILBERT, Circuit Judge, after stating the facts.—In the prior art were shown numerous patents involving the use of compressed air for conveying through pipes a wide variety of materials such as concrete, crude oil, dredge spoil, sand and water, grain, molten sulphur, etc. As to all prior patents the appellant insists that none is anticipatory of its combination for that they all lack the salient feature thereof, the arch breaking nozzle or anything that could exercise the function thereof. Of the prior patents we find it necessary to refer particularly to but three, the patent to Smith, No. 122,498, of January 2, 1872, and the English patents to Duckham, one No. 4400 of 1875, and one No. 15,348 of 1885. The Smith patent was for "An improvement in the manufacture of concrete pavements and machinery for same." The specifications described the apparatus as specially adapted to the manufacture and convection of concrete composition through pipes so as to set quickly upon reaching its destination and form a solid mass of artificial stone, and uncontradicted

testimony was given of the successful use of the Smith machine in conveying concrete through a pipe by compressed air. The device contained all the features of the appellant's patent except the nozzle for admission of air near the point of exit. The Duckham patent of 1875 was for improvements in discharging mud or soil from dredges. The mud was received in tanks capable of being closed airtight, with the exception of inlets for the compressed air and an outlet for the spoils. In the specifications Duckham said, "I prefer to inject compressed air * * * through a number of nozzles at the bottom of the tank, said nozzles being pointed toward the outlet. By this means the particles are prohibited from settling and are kept in suspension until the whole is expelled from the tank. Compressed air may, moreover, be admitted into the discharge pipe with the same object." We think it indisputable that Duckham in prescribing the use of pipes for the admission of compressed air in the tank, the same distributed along the bottom of the tank and one of them locatable at the exit, presented the use of all that is included in the appellant's combination, save and except the U-bend, an exception which is negligible so far as the present litigation is concerned, and if there is distinction in the fact that Duckham used no air pressure above the contents of the tank and thus omitted one of the features of the appellant's combination, that feature is also absent from the Hackley combination used by the appellee. But the appellant asserts that Duckham was work-

ing with a material which would flow with facility and that the nozzles which he used were intended for no other purpose than to stir up the mud in the bottom of the tank. It is true that Duckham was engaged in moving a material quite different from concrete, but that fact is not of importance on a question of anticipation, Concrete Appliances Co. vs. Gomery, 269 U. S. 177. In his second patent of December 14, 1885, Duckham says: "The mud or spoil was received directly from the dredging buckets in a tank or tanks, whence it was expelled through outlet pipes by means of compressed air admitted at the upper part of the tank, assisted by compressed air and water injected at the bottom of the tank to agitate the mud and prevent thick deposit," and if we may refer to the Engineering Publication Minutes of the Proceedings of the Institution of Civil Engineers (1887) in evidence here, we find that Duckham stated that "with clay or stiff mud, if the nozzles of the air-injection pipes were too small, the compressed air instead of driving out the material simply pierced holes through it, escaping through the discharge pipe and carrying along with it all the liquid and thin material in the tanks. This defect was easily rectified by rearranging and increasing the size of the large injection nozzles, and the apparatus now gives most satisfactory results."

It is assigned as error that the trial court found that Leake had made the invention in issue prior to the date of McMichael's application. In the opinion of the trial court it is said, "Prior to Mc-

Michael, Leake had conceived the idea and in 1905 in New Orleans had publicly and successfully employed it in concrete building operations, for despite Leake's reluctance to testify against his assignee, the plaintiff, the evidence, in quality and quantity, inspires confidence and constrains conviction of the truth of the fact, and beyond reasonable doubt." The McMichael application was filed January 14, 1907, and nine months later on October 7, 1907, was filed Leake's application, which presents everything contained in the McMichael application with the exception of the U-bend. Leake said, "The object of my invention is to provide a method and apparatus for preparing a concrete mixture and delivering it while in a plastic condition to the place where it is to be utilized. Another object of my invention is to move plastic concrete from one place to another by means of air pressure." On May 12, 1909, interference was declared between McMichael and Leake and Wm. W. Darley, who had applied for a patent on "apparatus for handling ashes and other materials." Leake and Darley each filed an affidavit setting forth their respective dates of conception and reduction to practice. Darley was dismissed from the interference as being found subsequent in time to the others. Leake's affidavit stated that he "conceived the invention set forth in the declaration of interference on or about the 1st day of February, 1905, that he first made drawings of the invention on or about the 1st day of March, 1905, and first explained the invention to others on or about the

1st day of June, 1905, that he first embodied his invention in a full-sized machine which was completed on or about the 1st day of September, 1905, and that on or about the 1st day of September, 1905, the said machine was first successfully operated in the City of New Orleans, and State of Louisiana, and that he has since made and used other machines embodying the same invention." Before the interference was declared it was represented on behalf of Leake's application that he had done a large amount of experimental work in connection with his invention. "He has successfully moved concrete from the place where it is mixed to the place where it is to be used, by means of air pressure, using the apparatus disclosed in his application." Again it was said, "He has given considerable time and thought to this matter and has actually constructed several plants where this is done. Their operation is highly successful and appears to be a decided improvement over previously known methods for handling plastic concrete." But no showing was made or evidence offered to carry the McMichael invention farther back than the date of his application, nor was any proceeding had in the Patent Office upon his application until 19 months thereafter when for a consideration of $6,000 Leake assigned his application to McMichael's attorney, who later assigned it to the appellant which had become also the owner of the McMichael application. The long period of inaction and silence on the part of McMichael, unexplained as it is, together with the payment to

Leake of so large a sum of money as $6,000, payable as it was in annual installments until March 1, 1920, is strongly suggestive of the inference that McMichael recognized the priority of Leake's invention and could furnish no proof to the contrary. As a witness for the appellee in the court below, Leake testified that he conceived the idea of moving concrete, as set forth in his application, about February 1, 1905, that he made a container in which to put the concrete and by the means of an air pipe extending therefrom shot it up on top of a power-house then being constructed in New Orleans, that when the air pressure was applied, the concrete all went up and landed on there, that later he built a commercial apparatus in Chicago and operated it in conveying dry cinders to the fifth floor of a building. His testimony, together with his preliminary statement, carried the date of his invention back of that of McMichael and showed an actual reduction to practice by Leake as early as 1905. We find no ground for disturbing the trial court's conclusion. The question at issue was which of two applicants for patent was the inventor. Both presented drawings and plans of the same invention. Leake furnished evidence of the time, place and circumstances of the reduction of his invention to practice. There was no denial of the truth of his testimony. In Armstrong vs. De Forest Radio Telephone & Tel. Co., 280 Fed. 584, 590, it was said: "While it is true that uncorroborated testimony of an inventor is to be accepted with caution * * * yet there is no rule

of law that requires the rejection of the uncorroborated testimony of an inventor as to the date of its conception. The court must be satisfied as to the fact of the demonstration and that the conception was complete." In Reed vs. Cutter, 1 Story, 590, 596, Mr. Justice Story said: "If the invention is effected and put into actual use by the first and original inventor, it is of no consequence whether the invention is extensively known or used, or whether the knowledge or use thereof is limited to a few persons, or even to the first inventor himself.'" So in C. F. Mueller Co. vs. A. Zeregas Sons, 12 Fed. (2d) 517, 518, considering the question which of two was the real inventor, Judge Hough said, "The question of invention as between Mueller and Wild is really only one of veracity. There are no presumptions or artificial rules regulating such an investigation, and the evidence of one witness may be sufficient," citing Thompkins vs. N. Y. Woven Wire etc. Co., 159 Fed. 133. That the testimony of one witness may be sufficient in such a case is held in Mayer vs. A. & H. G. Mutschler, 248 Fed. 911, 914, where it was said that one witness may suffice if the surrounding circumstances are confirmatory.

But it is insisted that neither Leake's combination nor that of Duckham can operate successfully, as does that of the appellant, to convey concrete and pack it at the place where delivered more effectively than could be done by hand tamping, a result which it is said is accomplished by the appellant's delivery of the concrete with velocity and

momentum in successive slugs or parcels The trial judge held that the slug theory is not proven and is untenable, and said, "It may be that if the upper and lower air were alternately applied some quasi slug action will follow, akin to the action of Saunders air lid pump, Patent 597,423 of 1896, but not when simultaneously applied, as here." There was no suggestion of a slug theory in the original application of McMichael, but when the patent was issued, more than eight years later, it was stated in the specifications that the lower air pipe adjacent to the discharge duct "serves the double function of preventing choking in the entrance to the delivery pipe and of supplying air under pressure in sharp jets directly to the delivery pipe itself." The slug theory was obviously adopted, from expressions found in Leake's application in which he proposed the use of a combination consisting of two tanks discharging into a single conduit alternately, by means of which the main body of concrete "can be detached in portions and blown into the conduit and driven along the same." Such a result might be accomplished by the use of his combination but it is not apparent that any slug action occurs in the use of either the McMichael or the Hackley combination. In neither is there intermittent pressure or "sharp jets" of air and in both there must necessarily be exerted a steady and continuous force from the upper and the lower air nozzles combining to drive forward the concrete and deliver it in a practically unbroken stream, and if indeed a temporary obstruction of material at the

exit should occur it is not believed that its release would result in a slug action or a constantly intermittent propulsion of concrete, or that if such an intermittent action could in practice be accomplished any advantage would thereby be attained. The decided weight of the testimony is to the contrary. It is stated in the brief of appellant's counsel that the appellee's engineer, Hackley, admitted that the appellant's apparatus "operates on the slug principle." We do not so understand Hackley's testimony. What he said was that the air mixes with the concrete and as such prevents it from discharging as a solid mass, and that "the mass is broken up into portions which are driven ahead under high velocity by the air discharging from the pipe 34, this being of considerable importance as it positively prevents choking or blocking up of the apparatus." Hackley was speaking only of such breaking up of the discharging column as resulted from the admixture of air and concrete in the discharge pipe. He testified to having had experience in using the appellant's combination and that in so using it the concrete issued in a continuous stream and that in the use of his own device the concrete came out in a continuous stream mixed with the air, that the speed of the discharge thereof could be controlled by the operation of the valves and in use was so controlled as to make it as slow as possible for the purpose of preventing separation of the concrete and to prevent wear on the pipes, and that when the concrete is discharged it flows by gravity down the sides. Brock, a witness

for the appellant, testified that in the Skagit tunnel the concrete, when it came out through the 8-inch discharge pipe, "flowed down gently like over both sides." And such was the testimony of all the witnesses who observed the operation of the device in the Skagit tunnel. In fact there is but one witness for the slug theory, Ray, a consulting engineer and patent expert. He testified, in answer to the question: "How many slugs moved in a second?" "There may be twenty or thirty come out in a second. Then there will be an elapse of a second or two when none will pass through. Then there will generally be a group of two or more in the next quarter second. * * * It is impossible for the naked eye to detect the individual slugs of material issuing from the discharge end of the duct." Wilkins, an electrical engineer, an expert, testified on behalf of the appellee that he was familiar with the apparatus in controversy and had made tests in its operation, that in the use thereof there were no slugs or plugs such as Ray had testified to, that it was a continuous flow of the mixture of air and concrete, and that it issued from the discharge pipe without spurts or dumps. The court below credited the testimony of Wilkins as against Ray, and we think the court was supported by the overwhelming weight of the testimony.

We think that the slug theory, when all is said, has no bearing upon the merits of the present controversy, for whether or not the appellant's apparatus operated to deliver concrete in slugs or

sections, it is very clear that the Hackley apparatus operates in delivering a constant stream of concrete, interrupted only so far as it is interfered with by the air which accompanies it through the discharge pipe. Hackley used a horizontal tank and in his specifications he said: "With the present apparatus the concrete does not tend to pack or bridge around the nozzle as is the case where vertical tanks are used. The mass of concrete which any one air stream is compelled to move is relatively small and unpacked, and therefore the device operates quickly and easily and without danger of becoming clogged." The decisions in Concrete Mixing & Conveying Co. vs. Ulen Contracting Corp., 12 Fed. (2d) 929, and Concrete Mixing & Conveying Co. vs. The Powers Kennedy Company, relied upon by the appellant, were based on records widely different from that in the case at bar.

The decree is affirmed.

[Endorsed]: Opinion. Filed Aug. 20, 1928. Paul P. O'Brien, Clerk.

United States Circuit Court of Appeals for the Ninth Circuit.

No. 5425.

CONCRETE MIXING AND CONVEYING COMPANY, a Corporation,

Appellant,

vs.

R. C. STORRIE & COMPANY,

Appellee.

DECREE U. S. CIRCUIT COURT OF APPEALS.

Appeal from the District Court of the United States for the Western District of Washington, Northern Division.

This cause came on to be heard on the Transcript of the Record from the District Court of the United States for the Western District of Washington, Northern Division, and was duly submitted.

On consideration whereof, it is now here ordered, adjudged, and decreed by this Court, that the decree of the said District Court in this cause be, and hereby is affirmed, with costs in favor of the appellee and against the appellant.

It is further ordered, adjudged and decreed by this Court, that the appellee recover against the appellant for its costs herein expended, and have execution therefor.

[Endorsed]: Decree. Filed and entered Aug. 20, 1928. Paul P. O'Brien, Clerk.

At a stated term, to wit, the October Term A. D. 1928, of the United States Circuit Court of Appeals for the Ninth Circuit, held in the courtroom thereof, in the City and County of San Francisco, in the State of California, on Monday, the first day of October, in the year of our Lord one thousand nine hundred and twenty-eight. Present: Honorable FRANK H. RUDKIN, Circuit Judge, Presiding; Honorable FRANK S. DIETRICH, Circuit Judge; Honorable WILLIAM H. HUNT, Circuit Judge.

[Title of Cause.]

ORDER DENYING PETITION FOR A REHEARING.

Upon consideration thereof, and by direction of the Honorable William B. Gilbert, Frank H. Rudkin and Frank S. Dietrich, Circuit Judges, before whom the cause was heard, IT IS ORDERED that the petition filed September 11, 1928, on behalf of appellant for a rehearing of the above cause be, and hereby is denied.

[Title of Court and Cause.]

ORDER STAYING ISSUANCE OF MANDATE.

Upon application of Messrs. Williams, Bradbury, McCaleb & Hinkle, counsel for the appellant, and good cause therefor appearing, IT IS OR-

DERED that the issuance, under Rule 32, of the mandate of this Court in the above cause be, and hereby is stayed to and including November 6, 1928; and in the event the petition for a writ of certiorari to be made by the appellant herein be docketed in the Clerk's office of the Supreme Court of the United States on or before said date, then the mandate of this Court is to be stayed until after the said Supreme Court passes upon the said petition.

FRANK H. RUDKIN,
United States Circuit Judge.

Dated: San Francisco, California, October 1, 1928.

[Endorsed]: Filed Oct. 1, 1928. Paul P. O'Brien, Clerk.

[Title of Court and Cause.]

CERTIFICATE OF CLERK U. S. CIRCUIT COURT OF APPEALS FOR THE NINTH CIRCUIT TO RECORD CERTIFIED UNDER RULE 38 OF THE REVISED RULES OF THE SUPREME COURT OF THE UNITED STATES.

I, Paul P. O'Brien, as Clerk of the United States Circuit Court of Appeals for the Ninth Circuit, do hereby certify the foregoing two volumes, consisting of six hundred and eighty-one (681) pages, numbered from and including 1 to and including 681, to be a full, true and correct copy of the entire record excluding original exhibits, of the above-entitled cause in the said Circuit Court of Appeals, made pursuant to request of counsel for the appellant, and certified under Rule 38 of the Revised Rules of the Supreme Court of the United States, as the originals thereof remain on file and appear of record in my office.

ATTEST my hand and the seal of the said the United States Circuit Court of Appeals for the Ninth Circuit, at the City of San Francisco, in the State of California, this 12th day of October, A. D. 1928.

[Seal] PAUL P. O'BRIEN,
Clerk.

SUPREME COURT OF THE UNITED STATES

ORDER ALLOWING CERTIORARI—Filed December 10, 1928

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Ninth Circuit is granted. And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ, the case to be heard with No. 501 as one case.